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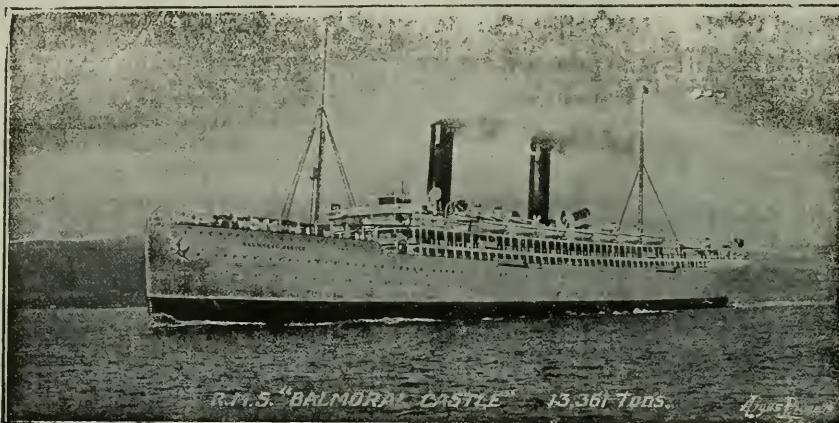
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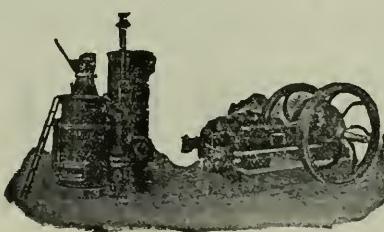
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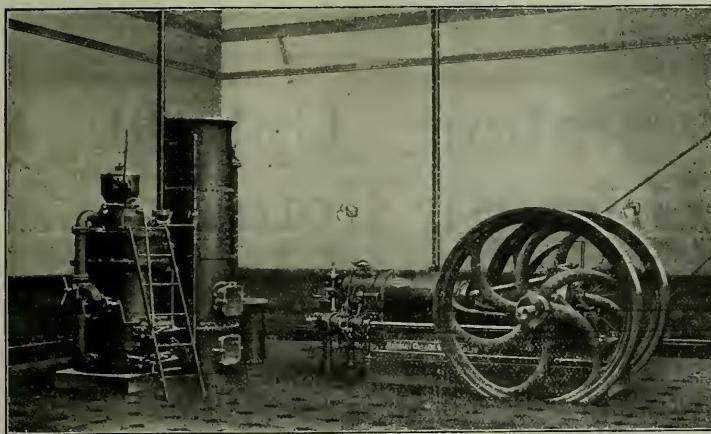
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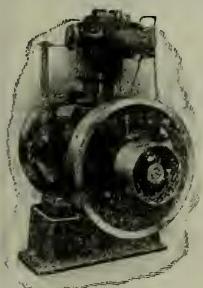
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Moore Patent Upheld by Highest Court

In the case of The Moore Filter Company vs. Tonopah-Belmont Development Company (defended by the Butters Company) the U.S. Circuit Court of Appeals has just handed down a sweeping opinion sustaining the validity of The Moore Process Patent (U.S. 764,486) for filtering slimes, holding the stationary or "Butters" type an infringement, and directing judgment against the defendant for an injunction and an accounting of profits.

From This Decision There Is No Appeal

This patent, now judicially declared valid, is for our basic and fundamental process of filtering slimes by submergence of the filtering medium, drawing away the solution through the filtering medium, and impoverishing or washing the cake by cleansing operation ; and anticipates and renders infringements all the various types of filtering apparatus using the process whether such types be movable, stationary (as in the present litigation) pressure, drum or revolute.

The Moore Filter Company New York, U.S.A.

Full text of this opinion will be published in the current issues of all the leading Mining Journals.

To Infringers Of The Moore Patents

After continuous and unwarranted misrepresentations as to the scope of the claims covered by our patents, having finally been awarded a far reaching *unanimous* judgment of the United States Court of Appeals before Judges Gray, Buffington and McPherson sustaining the Moore Process as a fundamental and basic patent, from which judgment there is no appeal, any statement oral or published to the contrary notwithstanding, we wish to inform all users of slime filters whether of the "Movable," "Stationary" (designed as "Butters" or otherwise), Revoluble, Drum or Pressure type, that we still stand ready to enter into agreements with them providing for the use of our patents upon royalties, terms and conditions similar to those we have been making with our licensees right along.

Naturally, this proposition will not long remain open and it is our intention to proceed later on against all who continue to deny our rights, or persist in infringing our patents and to exact payment of the entire amounts made or saved by the unlicensed use of our process.

The Moore Filter Company,
New York, U. S. A., or
HUDSON & FRAMES, Solicitors, JOHANNESBURG.

Butters Patent Vacuum Filters

There is no cause for uneasiness in regard to the recent decision of the Circuit Court of Appeals in the U.S., in the suit, Moore Filter Co. vs. Tonopah-Belmont Development Co., as the following letter from our Attorney clearly shows the narrow limitations of this decision :

New York, Nov. 11, 1912.

To the Butters Patent Vacuum Filter Co., Inc.,
50, Church Street, New York.

Gentlemen:

Please find enclosed a copy of the opinion written by Judge Buffington as the opinion of the United States Circuit Court of Appeals for the Third Circuit in the suit Moore Filter Co. against Tonopah-Belmont Development Co., over-ruling Judge Rellstab's decision in the lower court, and holding the Moore process patent valid and infringed. The decision that Moore's apparatus patent is not infringed remains in force.

My colleague, Mr. Kenyon, agrees with me that the serious errors of fact on which the opinion rests will be so obvious to all mining and metallurgical engineers that a modification of the opinion by re-hearing is (so far as it might form a persuasive precedent in other courts) quite unnecessary. As, moreover, the decision is binding as a legal precedent only upon the courts of New Jersey, Pennsylvania and Delaware, which form the Third Circuit, and as it is still subject to review by the Supreme Court of the United States by certiorari it should not give any alarm to licensed users of the Butters patent filters or processes anywhere else.

I strongly urge you to consider the advisability of publishing the two opinions together, thus letting public opinion throughout the world be formed upon full information of the reasoning of the two courts. The carefully studied opinion of Judge Rellstab, based on arguments that were not cut short by time limits, will speak for itself to those skilled in the art.

The other pending suit upon the Butters patents against the Moore Filter Co. is not affected by the present decision, but as the Moore Filter Co. has refused to admit its own responsibility for the use of the Butters acid wash and of reduced vacuum while the filter is exposed to the air, I strongly advise you to immediately sue the infringing users themselves.

(Signed) HAROLD BINNEY.

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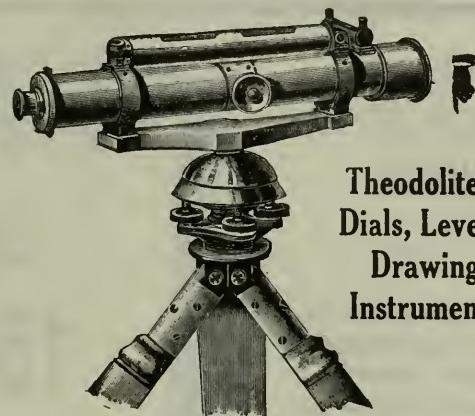
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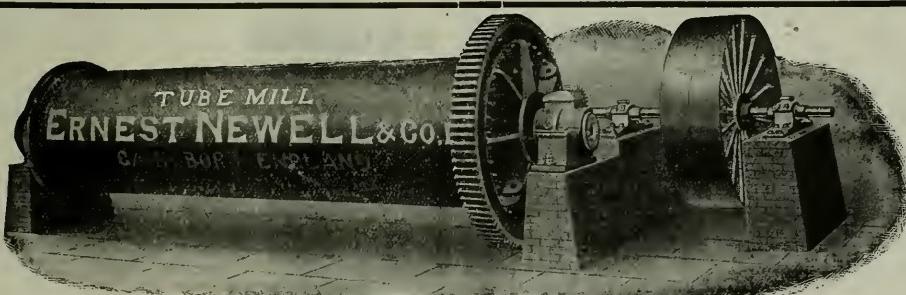
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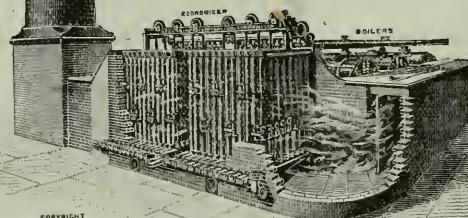
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NOTICE.—The postage of this issue of the *S.A. Mining Journal* is: South Africa, 1d. All other parts, 2d.

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Notes and News.

We are officially informed that the footage driven (risen or sunk) on the Modder Deep property

Modder Deep since development started to the 31st**Development Work.** December last—exclusive of 806 feet driven in connection with station work and 419 feet sunk in the incline shaft—was 1,426 feet, of which 433 feet were off the Reef and 433 feet were not yet sampled as the reef was only partially exposed. 560 feet sampled assayed 6.96 dwts. over 70 inches. We understand further that work is being pushed ahead, the labour supply has recently been increased, and a number of new faces will be opened up to expedite development.

* * * *

It is reported that the Kamfer's Dam blue ground is to be floored in future instead of crushed, better

Kamfer's Dam. results being anticipated from the former process. The returns are said to be satisfactory. The *Diamond Fields Advertiser* mentions three diamonds of very fine quality that had been shown by the managing director, Mr. H. J. Krauss, as having been found within a fortnight, just before Christmas. They weighed respectively 23, 59 $\frac{1}{2}$, and 92 $\frac{1}{2}$ carats. A correspondent writes that there are rumours in circulation to the effect that De Beers contemplate buying the property. In view of the policy of the corporation in these matters it would not be surprising if the rumour turned out to be true.

* * * *

A considerable amount of test washing is being carried out by the *Spes Bona* Syndicate on the farm**Spes Bona** Erfbloe, a portion of Vergelegen, which was prospected by the Lion Hill Diamonds, and the finds are said to have been good. It is stated that 26 stones have been recovered, and valued at £7 per carat. They have been recovered from old sortings, tailings and maiden ground left by previous workers. The largest stone obtained has been a 2 $\frac{3}{8}$ carats, of very good quality. About 65 loads have been tested, mainly by hand sieving and washing.

* * * *

We have been asked to draw attention to the coming sale of the 80 gold claims, valuable machinery,

Sale of a plant, buildings and general equipment of **Mining Property.** the New United Reefs (Sheba), Ltd. Extensive development work has been carried out and the mine and equipment are reported to be in good working order. Those who are interested in mining ventures in the outside districts would do well to consider the possibilities of this Barberton proposition. Details concerning the sale will be found in our advertisement columns.

* * * *

Mr. Andrew Robertson is retiring from the management of the Wolhuter Gold Mining Company at

A Well-known Mine the end of this month and will be succeeded by Mr. J. E. Maguire, formerly manager of the Jupiter mine, afterwards consulting engineer in Rhodesia to the firm of S. Neumann & Co., and more recently acting manager of the Robinson Deep. Mr. Robertson has been associated with the firm of S. Neumann & Co. for many years. He was formerly manager of the West Roodepoort Deep mine and about eight or nine years ago assumed the reins of management at the Wolhuter. Under Mr. Robertson the Wolhuter has emerged from a seemingly rather hopeless position to the dividend-paying stage. Despite many difficulties Mr. Robertson has brought the concern to a state of stability which must be as satisfactory to him as it has been to the controlling house. The retirement of Mr. Robertson from active mining service will remove from the Rand one of the most popular, diligent and capable of the older school of managers. His record at the Wolhuter indeed is one to be proud of. We understand Mr. Robertson intends farming in the Transvaal, and we, in common with many others, wish him all success and happiness in his new sphere of activity.

We are officially informed that owing to the unfavourable result of development work, as indicated in recent quarterly reports, and the consequent gradual reduction of ore reserves, it has become necessary to raise money to prosecute development work in the unprospected portion of the property and to re-open the Botha Reef Mine in its lower levels. The Board of Directors regrets that its endeavours to raise money for this purpose have been unsuccessful, and as, under the circumstances, it is no longer possible to work at a profit, the Board has decided after very serious consideration and with the greatest reluctance to stop operations at once in the hope that the future will bring about such a reduction of working expenses as will enable the company to resume work and raise the money needed for further development of the property. In view of the circumstances the Debenture holders are being asked to agree to the suspension of the annual drawings, the company retaining the right to purchase debentures in the market or otherwise and remaining liable to redeem the whole of the debentures on 1st July, 1919.

* * * *

Tati Concessions property, which covers over 2,000,000 acres, and is in what is acknowledged to be one of the best districts in South Africa, has made progress during the last twelve months. If allowed to rest upon its present basis, and under its present management it bids fair to become a prosperous concern. For two and a-half years Mr. C. V. Thomas has been labouring, with his colleagues, to what he called "put the company's house in order." The directors have succeeded in doing so, but, instead of receiving the gratitude of all the shareholders, as might be expected, certain of these not merely criticise the directors' action, which they have a perfect right to do, but at the annual meeting used strong language towards them. Clearly the policy of the chairman has excited ire, and as to the management on the spot, nothing it appears will satisfy them but the blood of Mr. Temby. Everyone will agree with the chairman that, in view of the fact that Mr. Temby is shortly expected in England and will meet the shareholders, the animadversions upon his management might well have been postponed until his return.

* * * *

Diamonds have been found in Brazil since 1729, and for over a century and a half that country held first rank for diamond production. Bahia is even now a most important source of black diamonds such as are widely used in drilling, and at Bagagem and Agua Suja in Minas Geraes alluvial deposits yielding white stones of excellent quality are worked. In the last few years serious efforts have been made to interest capitalists in the United States in the development of these diamond fields, but the work has by no means been always well advised or even honestly conducted. The district attorney at New York is now investigating the promotion of certain diamond-mining companies in the United States, Canada, and England. An examination of one of the properties made by Mr. Louis S. Noble elicited the fact that the total value of the gravel that it was proposed to work was about five cents per cubic yard, including in the estimate gold, platinum, and diamonds. In promoting this property a photograph of one of the dredges working at Oroville is said to have been represented to be that of a diamond-digging dredge at Jequitinhonha.

* * * *

The discovery of wolfram near Klein Kharas and Nankeis in German South-West Africa, coupled with the fact that both wolfram and scheelite (cæleum tungstate) are known to occur in several localities of Southern Rhodesia, should serve to direct attention to the possibilities of tungsten production in South Africa. A few facts regarding this element will doubtless be of some local interest. As many of the uses to which the mineral tungsten is applied are of recent invention, few people are aware of the extent to which it enters into the life of the modern

world. Tungsten, for example, is the backbone of steel, one of the most variously used of metals. Last year there was a sharp decrease in the production of tungsten ore, owing to the decrease in the demand for steel tolls in which the bulk of the tungsten produced is used, and in commenting on that fact a recent bulletin of the U.S. Geological Survey gives some interesting information. The production of domestic tungsten ore in 1911 amounted to 1,139 short tons of concentrates, carrying 60 per cent. of tungsten trioxide, valued at \$407,985; in 1910 the production amounted to 1,821 short tons, valued at \$832,992. Tungsten is used chiefly in making steels that will hold their temper when heated, but it is most generally known as supplying the filament of tungsten incandescent lamps. The total quantity of tungsten ore used for electric lights, however, amounts to only a few tons a year. New uses of tungsten, in making electric furnaces, electric contacts and targets for Roentgen rays, have been developed, and the last two products are being actively manufactured.

* * * *

It has been understood for some time past that the Chartered Board was to be augmented and represented by new blood in the shape of one or two additional directors. We

A New Chartered Company Director. We now hear that Mr. Dougal Orme Malcolm has been nominated for election as a director of the British South Africa Company. Mr. Malcolm, who was born in 1877, was educated at Eton and New College, Oxford. He was elected a Fellow of All Souls in 1899, and entered the Colonial Office in the following year. Since that time he has served successively in South Africa, where he spent five years as Private Secretary to Lord Selborne, and in Canada, where he was Secretary to Lord Grey. He was transferred last year to the Treasury, and had recently been appointed secretary to the Dominions Royal Commission. This appointment he has now vacated in order to take up the work of the Chartered Company. Mr. Malcolm is the younger son of Mr. W. R. Malcolm, the senior partner in Coutts's Bank.

* * * *

Although the dividends paid out by the New Kleinfontein Company last year were 5 per cent. below **New Kleinfontein Results.** 1912 is only five thousand pounds less than that secured in the preceding twelve months. This result has, however, been obtained through the milling of an additional one hundred thousand tons, and it is thus clear that there has been considerable diminution in profit per ton. It may be recalled that in the beginning of 1910 the company further enlarged its reef area by the acquisition of 47½ Orient claims and that a policy of a 25 per cent. expansion of plant capacity was then resolved on. The shrinkage of dividends in the face of augmented plant capacity exhibited in the following table undoubtedly has been disappointing.

	Tons Milled.	Output.	Profit.	Dividends.
1911 ...	451,145	664,242	245,763	17½%
1912 ...	116,330	160,984	44,426	
	181,200	187,442	58,567	
	148,400	213,362	65,817	
	51,000	72,832	23,497	
	50,400	70,768	23,870	
	51,400	70,420	24,642	
Total ...	549,730	775,808	240,819	12½%

Further disappointment has been occasioned by the announcement that the consulting engineer estimates the life to be 13 years from January, 1913, as compared with 18 years from January, 1911, advised in the circular issued to shareholders on January 20, 1910. Full details regarding life estimate will be published in the forthcoming report, and anxiously are awaited. It is not our intention to question the accuracy of the consulting engineer's estimates, but as in the case of other mines it is probable that factors which cannot to-day be taken into account will assist in prolonging the life of this property. The profits, it may be

observed, improved steadily last year, and despite the smaller dividend and the less favourable evidence as to duration of operations, we by no means take a gloomy view of this long established proposition.

* * * *

Criticism of the policy of the directors of the Globe and Phoenix Gold Mining Company, Ltd., is contained in a circular which has been issued to the shareholders by Mr. George Agitation.

A. Porter, an Edinburgh solicitor, and two other gentlemen. It is proposed that a special meeting should be called to elect as additional directors "two able, energetic men bound to carry out those reforms in the management and conduct of the business which are urgently required." The authors of the circular write: "To keep gold in the mine is like banking sovereigns in a stocking or teapot, and to aim at a steady output over a long series of years instead of getting the gold quickly in our hands is to deprive us of the use of the earthbound capital for all the years that it is kept lying in the ground unproductive, awaiting the belated pick of the superannuated miner." Then objection is taken to "the method of remunerating the Board of Directors." Last year, it seems, the Board, who number seven, divided £16,800 among themselves, while, for the year before, their reward was £12,300. The method to which objection is taken is that whereby, in addition to their fixed remuneration of £800, the directors receive 5 per cent. on dividends. "This," the circular states, "is the explanation of the above-mentioned extravagant remuneration." It is suggested that the directors' remuneration should be reduced to £500 per annum, with, say, 2 per cent. instead of 5 per cent. on the dividends added, and, as an initial step towards this end, it is proposed, as already stated, that two additional directors, pledged to this policy, should be elected.

* * * *

The following circular has been addressed to the shareholders of the Oceana Consolidated Company, Ltd.:—"I am instructed by the

Oceana Consolidated. Board to forward to you, in accordance with the resolution adopted at the meeting, the enclosed verbatim report of the proceedings at the extraordinary general meeting held on the 16th instant. You will observe that the fullest latitude was allowed to those responsible for the agitation to substantiate the charges which they had brought against the directors, and that they failed to make good any of those charges; that the amendment for a committee of investigation was rejected by an overwhelming majority of the shareholders present; and that the resolution appointing the new directors was adopted with only five dissentients. Your attention is particularly requested to the statements made by Mr. Scott Lings and Mr. Herbert Smith, which contain a categorical and authoritative refutation of the charges which have been so recklessly circulated in reference to the affairs of the company. In forwarding the full report of the proceedings of the extraordinary meeting, the Board desire to place on record their strong conviction that further agitation is not in the interests of the company, and they venture to make a direct appeal to each individual shareholder not to lend his support to a course of action which can only result in injury to his own interests. The Board desire to take this opportunity of stating that, in their view, it is manifestly impracticable to conduct the business of such a company as this without contracting relations with other corporations and firms conducting an analogous business. But the establishment of such relations is not in any way inconsistent with the maintenance of the most complete independence of the Board as the representative of the shareholders at large. In this connection it is desirable, in justice to Messrs. L. Ehrlich & Co., to repeat the repudiation made at the extraordinary general meeting of the suggestions which have emanated from irresponsible quarters, to the effect that Messrs. Ehrlich & Co. have sought to control this company. On the contrary, they have rendered it loyal and valuable co-operation. Since the extraordinary general meeting, Mr. F. H. Hamilton has resigned his position as a director, and the Board regret the loss of an active and valued colleague."

TOPICS OF THE WEEK.

THE RAND OUTPUT FOR 1912.

The declaration of the December output yesterday makes it possible to comment on the magnificent total gold output of the Transvaal for last year. The output for the Province for the year was 9,124,209 fine ozs., or £38,757,560, which compares with 8,237,723 ozs., or £34,991,620 in 1911—an increase of 886,576 ozs., or £3,765,940, for the year. The Rand's 1912 output has been 8,753,568 ozs., valued at £37,182,795, as against 7,896,802 ozs., or £33,543,179. As to outside districts, there is an increase of 29,810 ozs., or £126,624, the 1912 production being 370,731 ozs., or £1,574,765, as against 340,921 ozs., or £1,448,141, in 1911. The 1912 returns thus constitute another record, both for the Rand and the outside districts.

It will be remembered that the output for the Transvaal for 1911 was greater than for 1910 by nearly three millions sterling, and the yield for the Rand alone was over 33½ millions. The increase for that year was 703,880 ozs., value £2,980,885, of which the Rand contributed 668,491 ozs., value £2,839,567, and outside districts an increase of 35,349 ozs., value £150,318. The number of stamps in operation in the Transvaal in December, 1911, was 420 more than in the corresponding month of 1910. On the Rand itself 360 more stamps were at work, while in outside districts there was an increase of 60. The coloured labour position for the months of December, 1910, and 1911, as far as labour in gold mines was concerned, was practically the same. The first and broadest conclusion to be drawn from the figures for 1912 is that at the present time the mines are crushing twenty-five million tons of ore per annum, and produce therefrom thirty-seven million pounds worth of gold. Of this amount eight million pounds are distributed among white workers on the mines, five millions among natives, and nine millions are paid for stores, whilst a million is paid to the State in direct taxation, and over three millions in machinery, renewals and capital expenditure on new equipment. Hence by far the greater proportion of the value of the gold yield is expended in South Africa, and upon this golden stream from the Rand depends in very large measure the prosperity of the whole country. We know of no more convincing argument for the sympathetic treatment of the industry.

FAILURE OF THE CONCILIATION BOARD.

FROM the silence that has followed the close of the sittings of the Conciliation Board, it would seem that the deliberations of that body have reached a deadlock. It may be of interest to recall the history of the appointment of the Board. It will be remembered that the Transvaal Miners' Association experienced considerable difficulty in its endeavour to secure a Conciliation Board under the Industrial Disputes Prevention Act, in connection with the new underground contract, which came into force on August 1. The first obstacle, the necessity for the disclosure of the names of all the miners applying, in order that legal technicalities might be properly observed, having been overcome, and about 800 names sent in, other objections were put forward by the mines. The companies gave the proper statutory notice to such employees as would be affected by the coming into force of the new agreement as from August 1, but the miners failed to give proper notice of their desire for amendment: consequently, their application was irregular. It was also pointed out by the companies involved that the new contract was working smoothly and well and that there was no likelihood of a strike resulting should the alleged dispute be not referred to a Board of Conciliation and Investigation. As regards the names of men submitted, attention was

drawn to the fact that some were unknown, some had left the company's employ since August 1, some had become employees since August 1, some were day's pay men, and some were not employed as miners. The Miners' Association ultimately met all these objections, and 16 out of the 17 mines in respect of which the Conciliation Board was granted then appointed their two representatives, namely, Messrs. Percival Ross Frames and Allan Kincaid. The miners' representatives were Messrs. F. H. P. Creswell and Wilfred Wybergh. Most of the evidence led failed to reveal any great grievance among the men, and it is possible that the Conciliation Board may allow the whole matter to drop. The effect of such a contingency would be to discredit the Industrial Disputes Act, and even to reduce it to a dead letter.

DIVIDENDS PER TON.

WITH the announcement of the results of the December operations it is possible to arrive at the total tonnages milled by the mines of the Rand for the year that has just passed. It is thus possible, also, to arrive at the rate of dividend per ton upon the basis of this crushing and the declarations of the various companies for the same period. It will be remembered that Mr. G. A. Denny, in a series of articles upon the Rand, which were published in *The Mining Journal* several years ago, drew attention to this method of considering dividends, and endeavoured to show that although a dividend in itself might appear satisfactory enough when regarded merely as a rate of return upon money invested, it was not necessarily so when looked at from a point of view which included the amortisation of the money invested. The presentation of these two aspects of a dividend upon a per ton basis emphasised the points under discussion considerably. It is not intended, at the moment, to study the returns of the companies which appear in the Chamber of Mines' analysis, a few of which are selected below. It is sufficiently instructive and interesting to compare the dividend rate per ton with the working costs and working profits of the undertakings quoted. The following companies, which appear by way of an introduction to the subject, are those which comprise what is known as the Eckstein group of mines. The first tabular statement shows the tonnage milled, total dividend paid, and rate of the dividend per ton milled.

Company.	Tonnage Milled.	Dividend, 1912.	Rate per Ton.
	1912.		s. d.
Modder B.	388,570	£140,000	7 2·2
New Modder ...	548,600	385,000	14 0·0
City Deep	479,690	156,250	6 6·0
Village Deep ...	596,900	185,618	6 2·6
Village Main ...	470,056	330,400	14 0·6
Robinson ...	577,300	618,750	21 5·2
Bantjes Cons. ...	286,453	56,509	3 11·3

The following table gives the working cost and working profit of each of these companies for the month of November last:

Company.	Working Cost.		Working Profit.	
	Nov., 1912.	s. d.	Nov., 1912.	s. d.
Modder B.	15	11	16	11
New Modder ...	19	1	16	0
City Deep ...	24	1	13	6
Village Deep ...	20	9	8	1
Village Main ...	18	3	23	6
Robinson ...	16	4	25	2
Bantjes Cons. ...	23	10	4	8

There are a few obvious discrepancies between dividends and profits which appear in a comparison which includes the November figures. It is only when the average profits for the year are ascertained that the differences can be usefully discussed. In a later review the necessary figures will be provided. The Village Main Reef profit, for instance, will be found to be on the average much lower than that indicated for November.

NORTHERN TRANSVAAL PROSPECTS.

At recent meetings of companies interested in the Northern Transvaal, valuable light has been thrown on the progress of mining in that part of the country. Messina prospects lately have been dealt with at length. It is sufficient here to say that the success of that copper company has encouraged capitalists to turn their attention to the Northern Transvaal, and to resolve upon a thorough examination of the copper prospects of the district. The possibilities of Murchison Range, naturally, came in for notice and comment at the recent annual meeting of the H.E. Proprietary—a venture long and largely associated with that neighbourhood. The company in the next few months intends to issue a memorandum to its shareholders explaining its plans for developing its interests in the North. In the course of his speech the Chairman said: The time has come when it is necessary to take a broad survey of the position, particularly as regards the Murchison Range. As we have told you several times, since we discontinued work on the Free State property, some years ago, the hope which we originally entertained of opening up a big continuous gold field on the Murchison Range must be abandoned. The surface indications are there, the parallel reefs are there, the values at times are very satisfactory. The work that has been done in the Free State mine and several other points, however, has shown that as far as we have gone the gold values are contained in patches which are very like plums in a pudding. The intervening spaces have, for the most part, proved unpayable. At times the results are very flattering to the worker. High values are obtained over the whole width of the drive, for some distance, and then comes a long stretch of unpayable ground, and the dead work that has to be done before values are again struck is more than sufficient to render the process uneconomical. The situation is concisely described in the report issued this year by the Mines Department of the Union of South Africa, which states that "owing to the very uncertain nature of several of the lenticular and other reefs, the patchy and erratic distribution of pay values, and the inherent geological difficulties of prospecting, there is not much room along the Murchison Range for larger enterprises planned on a more ambitious scale." This conclusion is broadly in accordance with the experience of the H.E. people. "I need hardly say," said the Chairman of the H.E. Proprietary, "it is no part of our purpose to discourage activity in the Murchison Range, and although we have done an enormous amount of prospecting and developing work, we do not consider for one moment that we have by any means exhaustively demonstrated the possibilities of the district, one way or another. From the very nature of the deposits it follows that rich surprises may be in store, but our work has shown that they will be surprises and cannot be regarded as expectations." This is a sound and conservative view from a quarter whence greater optimism might have been expected.

THE CENTRAL BUSHVELD AREA.

An Important Economic Region—The Various Rock Systems Represented—Favourable and Unfavourable Prospecting Conditions.

(For map see following page.)

THE accompanying sketch map of the central Bushveld area, including the Waterberg tin fields, and the diamond district east of Pretoria, shows the principal geological features of a region which, from the economic point of view, is one of the most important in the Transvaal. It includes the ground which has recently been referred to in this journal in the course of some brief articles on "Transvaal Tin Deposits," and shows at a glance the distribution of the various tin producing centres and principal centres of prospecting activity, as well as the relationship which exists between the several rock formations in which the tin occurrences are found. The data used in the making of the map have been taken from the different reports of the Geological Survey, and the map is of interest as piecing together to some extent information which has hitherto remained scattered and uncorrelated. Beginning at the upper right-hand corner of the map the principal tin deposits in the Potgietersrust district are shown running mainly down the centre of the strip of red granite which fringes the felsites and shales of the lower Waterberg system, and dips beneath them under the wide plateau of Waterberg sandstones and conglomerates that occupy so large an extent of the upper portion of the area. Lower down, Welgevonden and Welgelegen are found with their ore deposits in the vicinity of the granite-felsite contact. Further to the south-west come the Welgevonden, Doornhoek, and Doornkomb occurrences in the body of the shale-felsite area, yet probably at no great distance from the underlying granite. A gap in the continuity of the tin country is found here, owing to the protrusion of a large patch of Waterberg sandstone and conglomerates to the south-east. The shale-felsite group, at its lower horizons, together with the red granite, is hidden beneath the sandstones of the comparatively recent Karroo system, which, with the Bushveld amygdaloidal lava overlying them, is largely represented on the eastern side of the country included in the map. West of this big protrusion of the upper Waterberg beds the felsites and red granite reappear, and thence for a considerable distance, and over a wide extent of ground, to the west and south-west the red granite with its ore-bearing contacts, outcrops more or less boldly. A feature of the geology of this latter region is the situation of the tin occurrences around the granite felsite fringe, and their interesting development over the patch of Rooiberg quartzites which form an outlier of the lowermost Waterberg beds, enveloped on all sides by red granite. These quartzites constitute a section of the Waterberg system which lies beneath the felsite horizon, and it is curious to note that they are not as yet known to be exposed in any other part of the Transvaal. As explained by Dr. Humphery in the Geological Survey report for 1908:—"They are underlain by the Red Granite, and are overlain partly by felsite and partly by Red Granite, and have at least one thin bed of felsite interbedded."

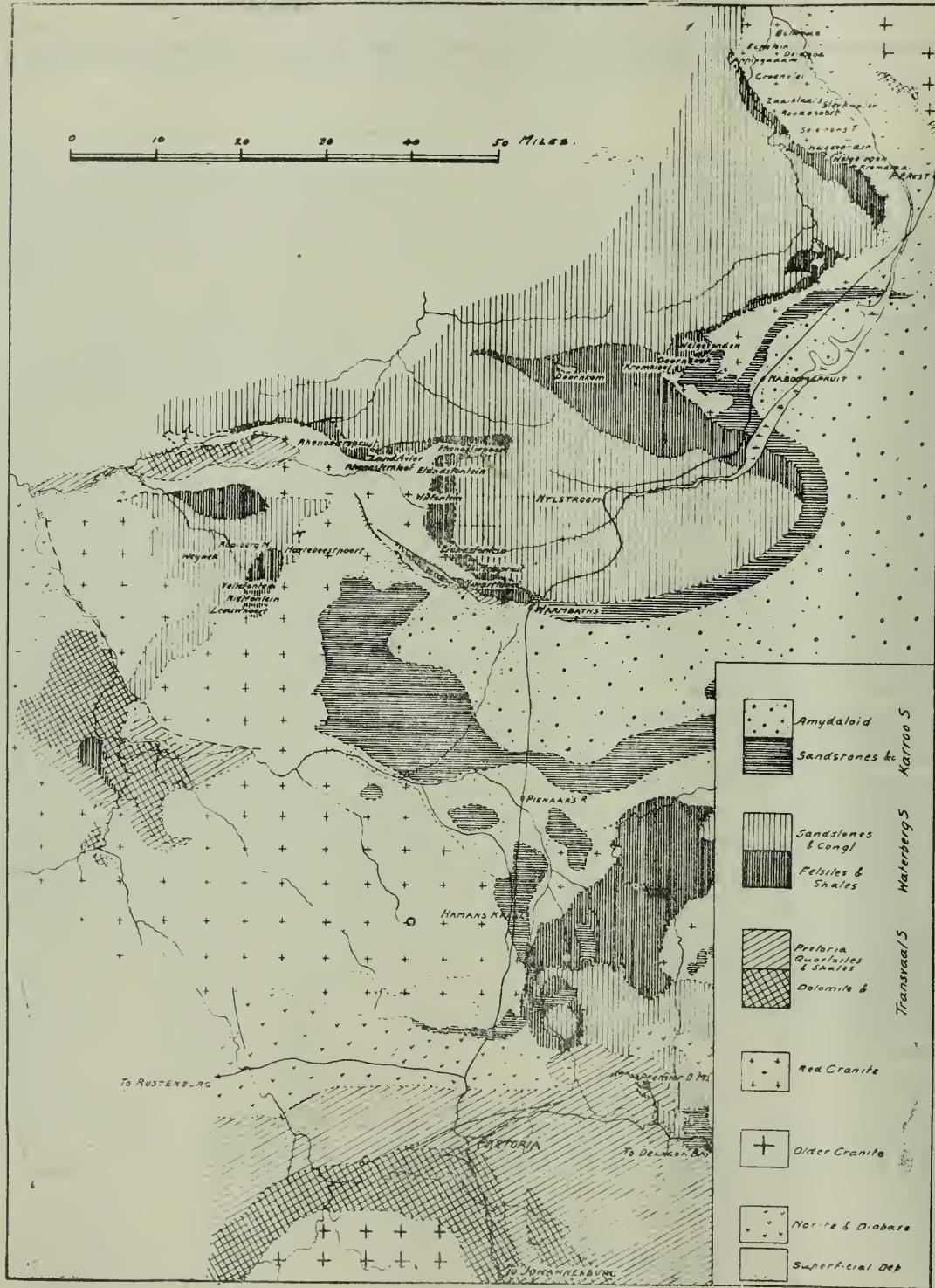
THE TRANSVAAL SYSTEM.

The rocks belonging to the Transvaal System, besides occupying the greater portion of the area east and west, as well as south, of Pretoria, are developed over two distinct areas in the vicinity of the Rooiberg. "The more normal and widely extending of the two occurrences," observes Dr. Mellor in the report already referred to, "is that which stretches in an east-west direction along the northern boundary of the area. This is part of the extensive development of these rocks which is to be found along the northern margin of the Bushveld Plutonic series from the Marico district eastward. They end up abruptly in the red granite immediately east of the area on the farm Sandfontein No. 2155. The main formation may be continued under the

quartzites and sandstones of the Waterberg formation which developed immediately to the north, but there is no continuous outcrop connecting these rocks with the banded ironstones and dolomite near Warmbath, as has been asserted, an uninterrupted zone of Red Granite being developed from the outcrop of the rocks belonging to the Waterberg System on the farm Zandriver No. 2136 southward to the Aapies River. There is, however, no question that these rocks belong to the same formation as is developed north-west of Warmbaths." To the south-west the extension of the Rooiberg beds abut against another local development of the Transvaal System. The whole of this body of rocks appear to represent a huge fragment of the System broken off from the main mass of the formation at the time of the subsidence of these rocks after the intrusion of the Red Granite.

THE KARROO SYSTEM.

The Karroo System is represented by the Bushveld sandstones and the Bushveld amygdaloid which fringe the mountainous country of the Waterberg and extend widely over the low-lying Springbok Flats, along the line of railway from Pietpotgietersrust to Pretoria. "Being of much later origin than the cassiterite deposits," remarks Messrs. Kynaston and Mellor in their memoir relating to the Waterberg tin fields, "the Karroo rocks have no special interest in connection with the tin fields, except in so far as they may render prospecting more difficult where tin deposits pass beneath them. It is possible also that some of the lower beds, both of this formation and of the upper division of the Waterberg System, might be found in places to contain cassiterite derived from the weathering of the original tin-bearing rocks, but no such instances are at present known." The extensive covering of the red granite which is effected by the rocks of the Karroo and Waterberg Systems are well shown in our sketch map, where it is seen that an enormous area of presumably red granite formation, between the main mass of the Waterberg System, in the northern part of the area included in it, and the Transvaal System in the southern portion is hidden beneath scattered patches of overlying rocks. Where these have been removed by denudation, the upper surface of the red granite, not greatly eroded by atmospheric agencies, presents numerous indications of the existence of tin ores. For instance, a few miles east of Haman's Kraal Station there is a well-known development of quartz leaders carrying tin in the granite just below the original surface, as proved by the vicinity of the felsite. In other parts of the red granite area, where, according to the theory discussed in some previous articles, the existence of tin might be looked for, for example in the country between the southern end of the Rooiberg and the norite diabase belt which overlies the Transvaal System in the south, the presence of large accumulations of sand and soil make prospecting particularly difficult. The encroachment of Karroo and Waterberg beds in the south-eastern portion of our map will be noticed. Here, piercing the felsites of the Waterberg System, is the world-famous Premier diamond pipe, while mainly in the Pretoria beds of the same district, approximately along the line of railway, occur those numerous other pipes and alluvial deposits which have engaged the attention of lesser companies on and off, for some years past. Here and there, notably east of the Pietpotgietersrust tin field, and south of the dolomite series in the lower portion of our map are found masses of the old granite which underlies all the sedimentary rocks of the country, and is in several ways to be distinguished from the younger red granite of the Bushveld laccolithic intrusion.



GEOLOGICAL SKETCH MAP OF THE CENTRAL BUSHVELD.

CORNER HOUSE MINES IN 1912.

Total Group Profit, Five and Three-Quarter Millions—Some Large Increases.

HEREUNDER we set forth in tabular form the tonnages crushed and profits earned by mines under Corner House control last year. For purposes of comparison the 1911 results are also stated.

	Tons.	Working Profit.
ROSE DEEP—		
March Quarter	191,300	101,163
June Quarter	190,500	107,218
September Quarter	196,400	106,550
October	68,100	35,633
November	67,400	33,717
December	68,500	36,865
1912	782,200	421,146
1911	695,100	349,032

GELDENHUIS DEEP—

March Quarter	172,960	40,232
June Quarter	165,000	46,737
September Quarter	146,100	15,030
October	48,500	12,565
November	45,900	10,688
December	49,500	9,198
1912	627,960	134,450
1911	801,860	235,594

FERREIRA DEEP—

March Quarter	90,840	92,809
June Quarter	119,430	130,380
September Quarter	157,970	142,763
October	54,900	54,658
November	53,240	53,381
December	54,660	58,192
1912	531,040	534,183
1911	371,706	405,022

CROWN MINES—

March Quarter	458,900	323,675
June Quarter	474,100	321,475
September Quarter	480,900	310,661
October	167,800	104,000
November	164,000	110,472
December	175,000	124,000
1912	1,920,700	1,294,283
1911	1,618,500	1,270,373

DURBAN ROODEPOORT DEEP—

March Quarter	69,825	15,152
June Quarter	73,300	22,330
September Quarter	75,780	23,149
October	25,570	7,712
November	24,370	7,030
December	25,150	6,657
1912	293,995	82,030
1911	262,540	60,807

NEW MODDERFONTEIN—

March Quarter	147,530	102,167
June Quarter	133,470	123,944
September Quarter	121,700	134,965
October	47,400	47,518
November	48,000	38,798
December	50,500	53,126
1912	548,600	500,518
1911	574,600	370,561

	Tons.	Working Profit.
CITY DEEP—		
March Quarter	115,830	58,755
June Quarter	119,960	71,555
September Quarter	120,100	71,219
October	43,100	27,295
November	41,300	28,608
December	39,400	26,612
1912	479,690	284,134
1911	349,713	130,892
VILLAGE DEEP—		
March Quarter	147,400	70,343
June Quarter	149,700	64,549
September Quarter	149,900	68,811
October	50,100	24,519
November	49,000	19,821
December	50,800	22,600
1912	596,900	270,643
1911	569,500	225,779
VILLAGE MAIN REEF—		
March Quarter	98,070	58,086
June Quarter	117,946	113,956
September Quarter	129,040	141,958
October	42,500	50,526
November	41,000	48,842
December	41,500	44,225
1912	470,056	457,593
1911	476,250	459,515
BANTJES CONSOLIDATED—		
March Quarter	66,840	17,170
June Quarter	71,670	17,761
September Quarter	70,843	20,982
October	24,650	6,718
November	25,250	5,905
December	27,200	6,177
1912	286,453	74,708
1911	273,212	53,888
MODDER B.—		
March Quarter	92,600	74,084
June Quarter	95,600	91,799
September Quarter	100,370	101,323
October	32,160	27,277
November	33,710	28,580
December	34,130	34,612
1912	388,570	357,675
1911	77,960	48,609
ROBINSON—		
First Six Months	279,600	398,639
July	47,700	60,209
August	51,200	62,782
September	51,400	62,063
October	53,200	62,152
November	46,700	60,077
December	47,500	65,588
1912	577,300	771,580
1911	592,700	911,061

	Tons.	Working Profit.
NOURSE MINES—		
First Six Months	316,600	132,335
July	57,000	26,142
August	56,000	27,563
September	54,700	26,127
October	56,200	22,659
November	51,300	19,922
December	48,600	19,702
1912	641,000	274,450
1911	621,251	238,234

In March last gold reserves were abolished and the amounts stated hereunder were credited to the profits of the companies mentioned below.

Modder B.	£24,451
New Modder	39,280
Village Deep	24,755
Village Main	5,000
Ferreira	10,864
Robinson	44,290
Rose Deep	25,700
Geldenhuus Deep	1,717
Nourse Mines	2,465
Crown Mines	20,243

The declared estimated profits of the Rand Mines group for the year are:—

January	£206,122
February	209,989

March	... ... ... ...	*267,731
April	... ... ... ...	224,289
May	... ... ... ...	238,284
June	... ... ... ...	242,288
July	... ... ... ...	241,295
August	... ... ... ...	220,285
September	... ... ... ...	220,890
October	... ... ... ...	237,227
November	... ... ... ...	237,210
December	... ... ... ...	256,589

Total ... £2,802,199

* Including £50,129 special declaration of reserve gold.

For the other Eckstein subsidiaries profits have been:—

January	... ... ... ...	£221,326
February	... ... ... ...	213,242
March	... ... ... ...	*373,426
April	... ... ... ...	225,284
May	... ... ... ...	243,784
June	... ... ... ...	231,590
July	... ... ... ...	229,719
August	... ... ... ...	255,747
September	... ... ... ...	245,942
October	... ... ... ...	246,000
November	... ... ... ...	230,714
December	... ... ... ...	256,107

Total ... £2,972,881

*Includes £151,118 special declaration of reserve gold.

The Year with Koffyfontein.

Speaking at the recent annual meeting, the Chairman said, *inter alia*:—You were informed at the last annual meeting, in December, 1911, that the price we had been receiving for our diamonds up to the end of November, 1911, worked out at 44s. 3d. per carat. From that date on, till the end of September last, the price was about 49s., and I am glad to tell you that, commencing with October last, the price has been increased to 52s. 4d. per carat. The average yield for the year works out at 5·17 carats per 100 loads, which shows a little falling off as compared with last year, and is doubtless attributable to the bad condition of the ground washed, as during the last five months a higher average has been maintained, consequent on the ground treated being in a better pulverised condition. Coming to the profit and loss account, you will notice that the mine expenditure totals £182,000, compared with £209,611 last year, the reduction being consequent on the smaller amount of work carried out through night washing having been suspended. You were fully advised at the last annual meeting of the necessity for this stoppage. It will perhaps not be out of place for me to mention that there seems every possibility of the Union Government giving us a railway from Fauresmith to Koffyfontein next session, the advices we received from the manager, two months ago, being that he had seen General Botha with regard to the railway extension, and he (General Botha) told him that there is no doubt Parliament will pass a line to Koffyfontein next session if an agreement can be reached as to route; and to get over the trouble of local jealousies, General Botha proposed to ask the Minister of Railways to visit Koffyfontein and hear everyone's arguments, and decide on which he considered the best route, which will do away with the possibility of local opposition. The working costs of the mine come out at 2s. 4½d. per load, an increase of 5d. per load, which is attributable to the fact that, while standing or fixed charges have only shown a small decrease, the number of loads treated during the year has decreased by 562,701 loads; so that the mine expenditure has been spread over a much smaller amount of work and comes out proportionately higher; in other words, working costs decrease when a larger number of loads is treated, and increase when a smaller number is dealt with, as the fixed charges are spread over a larger amount of work done. During the year a liberal amount has been expended on renewals, and maintenance of machinery, amounting to £15,917 9s. 1½d. White wages cost £27,162 3s. 4d., and show a small saving over last year, and native wages, £77,258 13s. 2d., are some £15,000 down as compared with last year, consequently on the decreased amount of work carried out. On the creditor side of the profit and loss account, the sale of diamonds during the year, less royalty paid, amounts to £184,414—a falling off as compared with the previous year, consequent on the reduced scale of working already referred to. You will notice that during the year an additional 464,221 loads of blue have been added to the floors, costing £26,840, so that at the 30th June last we had over £90,000 worth of blue ground weathering out on floors. Since the 30th June we have continued the policy advocated by the general manager, and have added 455,000 more loads, so at the present time we have 2,193,000 loads of blue ground on the floors, costing

£117,539, which is a very valuable asset. Transfer fees and sundry receipts amount to £457, leaving a credit balance of £4,867 to be carried to the balance sheet, which, added to the balance brought forward, £21,981, makes a total of £26,759 to the credit of profit and loss account, which it is proposed to carry forward.

ABSENCE OF DIVIDEND EXPLAINED.

I have no doubt that many shareholders will be disappointed that it has not been possible to recommend the payment of a dividend—(hear, hear)—but the inability to do so is entirely owing to the fact that we had to stop night washing on account of the ground from the lower levels taking a much longer time to pulverise than the ground from the higher levels. Had the policy of day and night washing not been discontinued in November, 1911, we should have entirely run out of pulverised blue ground a few months later, with the winter months in front of us and with no chance of getting the ground into a washable condition for at least six months. This would have meant that we should have had to stop washing by day as well as night, and I am sure you will admit the manager was justified in the course he advised.

Kolmanskop Diamonds.

The output of diamonds from this company's property at Luderitzbucht for the month of December was 10,360 carats.

Glynn's Lydenburg.

The following are particulars in respect of this company's output for the month of December, 1912:—Tons crushed, 2,841; yielding, 1,518 fine ozs., valued at £6,338; estimated profit for month, £2,789. The mill was hung up at intervals during the month, owing to stoppages at the power station, caused by lightning and flood. The total stoppage was 46 hours. The consequent loss of profit is covered by insurance.

Transvaal G.M. Estates.

The company's output for the month of December, 1912, was as follows:—Central Mines: Tons crushed, 13,100, yielding 8,318 233 fine ozs. Elandsdrift Mine: Tons crushed, 730, yielding 738,759 fine ozs. Vaalhoek Mine: Tons crushed, 1,413, yielding, 585,388 fine ozs. Total value of month's output, £40,370. Total estimated profit for December, £23,172.

SITUATION ON THE WEST RAND.

Unsatisfactory Position at the Lancaster—Future of the Tudor and French Rand—Less Disturbed Ground in the Western Section of the Princess.

INTEREST in the West Rand has been quickened by the declaration of the long-promised dividends by the Randfontein Central and Randfontein Estates Companies. The supreme test of the success or failure of mining is, of course, indicated by its dividend declarations. That, at any rate, is the view adopted by shareholders, and shareholders must necessarily be the prime consideration of any industry.

THE DIVIDEND RECORD.

Judged on the basis of dividends, the West Rand, as is well known, compares unfavourably with the Central and Eastern sections of the fields. The section lying to the west of Roodepoort for all its thirteen miles of strike along the sinuosities of reef outcrop, with the exception of the two hundred thousand pounds distributed amongst shareholders in the Randfontein Central, paid out nothing last year in dividends. To date Rand gold mines have paid out in dividends eight-eight millions sterling, but of this magnificent total the mines of the West Rand have not paid out more than two millions sterling, or only about 2·3 per cent. of the total. To-day the West Rand presents many features of interest, and there are points in connection with the section of the Witwatersrand lying to the west of Roodepoort which afford cause for optimism as well as features which admittedly are unsatisfactory. Randfontein profits have steadily been increasing of late, and as we remarked in our last issue the declaration of substantial dividends by Randfontein Estates, as well as Randfontein Central may mark the commencement of a new era for this vast proposition. Another very large enterprise in the shape of the West Rand Consolidated, under Albin control, has, too, secured very much improved returns of late, so much so that an extension of plant has been sanctioned. Admittedly much of the West Rand Consolidated property is disturbed to a degree which renders profitable mining operations difficult to achieve, but, at the same time, the larger profits secured during the past few months, coupled with the more encouraging developments in the deeper level section of the property justify one in hoping that shareholders will at no far distant date be in receipt of some tangible reward. So far, this mine has paid out one dividend involving £74,228, which on the large capital of the company represents the distribution of only 3½ per cent.

LANCASTER, FRENCH RAND AND TUDOR.

Of the adjoining property right on the confines of Krugersdorp township one cannot unfortunately speak in anything but pessimistic terms. For some time past the proposition has been running at a loss, and it is no secret that the two Lancasters, which for the past couple of years have been operated as one, have occasioned the controlling house a great deal of anxiety. There appear to be no redeeming features in regard to development, and this,

coupled with the poor outputs declared, lends credence to the view that unless a marked change for the better—of which, unfortunately, there is no indication—occurs the management may find it imperative in the not far distant future to suspend operations. Notice of closing down appears elsewhere in this issue. The French Rand and Tudor both have been dormant for some considerable time, and there is not at the moment anything to indicate that work is likely to be resumed in the near future. There have been rumours in circulation that the French Rand is to be re-opened on a tributary basis. We understand that such a scheme was given consideration a few months ago, but apparently nothing has come of it. As to the Tudor, some scheme may be put forward in the event of more favourable circumstances prevailing in the money and share markets for the re-opening of the shafts. It is, however, unlikely that the Tudor will be re-opened as an individual property. Sir Abe Bailey holds the deep level ground of this section—French Rand Deep and South French Rand—and in any scheme of amalgamation that may be projected for this area it is to be assumed that he will be an important factor.

THE PRINCESS.

To come a little nearer home, it is of considerable interest to learn that in the western section of the Princess Estate abutting almost on to the "Witpoortje break," fair development results are being secured. This section previous to the enlargement of the Princess Estate area was known as the West Roodepoort Deep, and it did not acquire a particularly enviable reputation as a mining property. It is, therefore, satisfactory to learn that in the lower levels the ground is substantially less faulted than in the upper section of the mine.

WEST RAND DIVIDENDS TO DATE.

On the subject of the West Rand and its dividend payments, the following list of sums paid out by mining companies owning ground to the west of Roodepoort should prove of interest. The totals are those declared up to the end of last year.

Randfontein South	£500,000
Porges Randfontein	342,500
South Randfontein	225,500
Randfontein Central	200,000
Robinson Randfontein	180,000
North Randfontein	180,000
West Rand Consolidated	74,228
Lancaster	65,105
French Rand	64,250
Luipaardsvlei	59,760
York	29,600
Windsor	20,000
Lancaster West	19,500
West Rand Central	15,477

Ceylon Lydenburg.

The following are particulars in respect of this company's output for the month of December, 1912:—Tons crushed, 664; yielding 405 fine ozs.; estimated value of output, £1,693; estimated profit for month, £966.

East Rand Proprietary Mines.

The following is the text of a cablegram which has been despatched to the London office of the East Rand Proprietary Mines, Ltd.: "The results of last month's operations are as follows:—820 stamps milled 155,500 tons, 58,034 ozs. of fine gold recovered from all sources; £94,654 profit for the month."

City and Suburban.

The result of this company's operations for the month of December is as follows: Tons milled, 27,300; gold recovered, 12,078 fine ounces; profit, £23,045.

Piggs Peak.

Details of the result of operations for the month of December, 1912, are as follows:—25 stamps ran 25 days, 1 tube mill ran 23 days, crushing 2,510 tons, yielding 563·93 fine ozs. Cyanide works treated 2,360 tons, yielding 280·87 fine ozs. Concentrates shipped 5½ tons, containing 141·75 fine ozs. Total recovery from all sources, 992·55 fine ozs. Estimated value, £4,188. Costs, £2,137. Profit, £2,051.

ENGINEERING IN 1912.

No Remarkable Developments—Progress on the Rand—Achievements in the World. Generally.

No really sensational developments in engineering practice have to be recorded in South Africa during 1912. Rather has there been a gradual improvement of existing methods and an extension of what generally is recognised as the best practice than anything in the nature of a radical change in method or type of mechanism employed.

NEW PLANTS.

Further electrification of the mines has been proceeding, and with the completion of the new station of the Victoria Falls Power Company at Vereeniging an increased supply of current has been made available and has been taken advantage of by a number of mines, notably the Consolidated Langlaagte. This latter concern and the Crown Mines were the only companies to start up new mills during the year. Each of these installations represents the most advanced design and practice in gold milling under the conditions prevailing on the Witwatersrand, but in neither instance has there been any remarkable innovation either in type or in subsequent running method. Perhaps the installation of one tube mill per 10 stamps at the Consolidated Langlaagte is worthy of remark, yet after all this merely is going a step further in fine grinding and has been a development foreseen for a long time past. One large new mill for the Witwatersrand was ordered during the year. This is for the Van Ryn Deep Company, where erection was begun a few months ago. But this equipment, too, will not embody any very novel features and will, in fact, as has already been stated in the columns of this journal, be almost a duplicate of the Consolidated Langlaagte plant.

NISSEN STAMPS.

In Rhodesia there has been a disposition to erect Nissen stamps in preference to ordinary Californian heads. There is nothing to indicate that the gravitation stamp battery is going out of favour as a prime crushing agent. Whilst on this subject reference may be made to the qualified success of the Hardinge mill at the Village Deep.

UNDERGROUND LABOUR SAVING DEVICES.

In stope drills there has been further endeavour to solve the problem of the effective substitution of mechanical appliances for hand labour. In this direction encouraging results have been secured at certain mines under the control of the Consolidated Gold Fields, notably at the Knights Deep. At this latter mine, too, a considerable measure of success has been achieved in experimenting with detachable bits.

BRAKING OF HIGH SPEED HOISTS.

The end of the year has found the engineering community of the Rand largely absorbed in the highly important question of the "Braking of High Speed Winding Engines." The discussion resulting from the admirable paper read by Mr. Chambers on this subject at a recent meeting of the S.A. Association of Engineers coupled with the fact that the engineering staffs of the Government Mining Department and of the big houses have for some time past been giving the matter most earnest consideration leaves no doubt as to the importance of the issues involved.

THE COMMERCIAL ASPECT.

In so far as the purely commercial side of engineering is concerned it must be admitted that 1912 has not been a particularly brilliant year. Mr. Robert English, presiding at the recent meeting of Fraser & Chalmers, directed attention to the lack of new constructional work proceeding, but as against this it must be recorded that the supply of renewals, spares, etc., to the mines during 1912 represented a very lucrative harvest to mining machinery merchants, and the year just commenced certainly will show no abatement of activity or orders in these directions.

THE WIDER ASPECT.

Engineering progress the world over has been nothing great or remarkable during the past year. This fact is alluded to in "Engineering Notes," an admirable little monthly publication issued by a well-known Fenchurch Street firm. In the course of an interesting review of the year in the engineering world, it is stated therein: "It cannot be said that there have been any great achievements in the past twelve months; good progress has undoubtedly been made all round, but this has been due to developments rather than to innovation. In locomotive, stationary, and marine engineering, we are distinctly ahead of last year. The advantages of superheated steam for locomotives, hitherto conceded grudgingly, are now generally admitted, and with a superheater and a feedwater heater the modern locomotive is a marvellously complete, self-contained machine, so much so that we look forward to further developments with wonder and respect for human ingenuity. In stationary plant the most notable feature has been the wide adoption of the exhaust steam turbine for the utilisation of exhaust steam that was previously wholly or partially wasted. These turbines are not novelties, but there was a tendency to regard them as costly investments that gave hypothetical benefits. Experience has proved otherwise, and they are now being run to great advantage on exhaust steam from reciprocating engines, steam hammers, heating jackets, and other unlikely sources. The enormous saving that can be effected in this manner in a large works seems almost incredible, and the mere suggestion of it would have been ridiculed a few years ago. Marine engineers may fairly claim to have made the most notable progress by the widespread adoption of the Diesel engine as a means of propulsion for large vessels. This has been done in the face of many objections, the chief of which was that this type of engine was not adapted to the essential requirements of a marine engine, viz., simplicity of construction, accessibility, and reliable quick-acting reversing gear. By working closely along the lines followed by the designers of marine steam engines, the builders of Diesel engines have succeeded in producing engines that not only fulfil these requirements, but are much more economical than the average steam engine. It is true that the mechanism is more complicated than that of the steam engine, and is therefore more likely to get out of order. This is specially noticeable in the various reversing gears adopted, but there is no doubt that when a little more experience has been gained in the working of these engines, the improvements that can be made in this direction will suggest themselves. Other forms of internal combustion engines stand where they were last year, and it is difficult to see in what direction improvements can or will be made. The efficiency of the gas engine now stands very high, and with producers that will make gas from almost any combustible material, the possibilities of this form of power must be somewhere near the limit. With regard to petrol motors, it would appear that there will be no radical change in the type of engine for some time, and even the adoption of a cheap substitute for petrol, which is bound to come sooner or later, would probably only call for slight modifications in existing designs. Taking things 'by and large,' as sailors say, the engineering trade has flourished exceedingly during the past year, and the prospect is therefore bright and cheerful."

Sheba G.M. Co.

Sheba Mine.—Operations for month of December: Mill ran 29 days, crushed 4,900 tons, yielding 3,350 ozs. fine gold; estimated profit, £6,452. Rosetta: During November and December, 883 tons crushed, yielding 375 ozs. fine gold.

DEEP ORE BODIES.

Questions of Hoisting, High Temperature, and Rock Pressure.

The following interesting paper on this subject has been contributed by Mr. F. Lynwood Garrison to the *Journal of the Canadian Mining Institute*:—Anyone who has kept in touch with the trend of development in metal-producing and especially precious metal-producing districts, must have noted with interest the repeated instances of discoveries of ore-bodies at relatively deep points in old mines, thus instilling new life to the neighbourhood and affording encouragement to operators of mines similarly situated to explore and extend their deeper levels. In directing attention to this important subject it must be recognised that the matter is one whose inherent difficulties may not be lightly disregarded, and one in which unwarranted deductions might be drawn for promotion purposes or to deceive. It is but proper to say at the outset that payable ore deposits do not usually persist in great depth, in fact, in a geologic sense, they are essentially superficial phenomena. It is true mineralised fissures are known to extend to depths of 6,000 feet, and probably much more, but it seems likely they will seldom be sufficiently rich to pay. In this paper the author only contemplates such veins as have had their mineralised contents deposited by filling or replacing along fissures through which the metal-bearing waters and vapours have supposedly circulated. Instances of the discovery of new deep-seated ore-shoots are not uncommon in well-established metal-producing districts where systematic exploration and development are being carried on. A number of such cases might be cited, including the famous Comstock and some of the old mines on the Mother Lode in California. At Guanajuato, Mexico, the lower reaches of the Valenciana lode on the "Veta Madre" are to be tapped at a vertical depth of 2,000 feet below the collar of the Nueva Luz shaft, and about 3,300 feet on incline from the top of the old Valenciana shaft, by new workings with a reasonable assurance of finding large bodies of payable ore. It is evident there exists among experienced mining people a belief that in profoundly mineralised regions, it is reasonable to expect the deep sections of great vein systems will continue to yield abundantly of their treasures whenever the costs of exploration and extraction are not prohibitive. According to H. C. Hoover, at Kalgoorlie, West Australia, there are several properties upon which ore bodies have been discovered in depth where none or but small ones existed at the surface. In another instance in this district a marked increase of value has been noted with depth. Recent experience at Tonopah, Nevada, tends to show a decrease in value with depth with a compensating tendency to wide lateral extent of pay ore in the veins, limited only by the characteristic block faulting of the district. However, it is not to be inferred from this that a vein or lode or series of veins are necessarily continuous laterally through the full extent of such a block. Evidently such is not the case, for the veins appear to cease laterally as they do in depth even before being cut by a fault or intrusive dyke. But the practical point in this instance is that the chances of finding ore are overwhelmingly greater in lateral exploration than in vertical. It would seem that the deep underground circulation which concentrates metallic minerals at convenient voids in quantities sufficiently large to pay for extraction, is both upward and lateral, and that both seepage and capillary circulation contribute no small increment. That the metals now found in deep-seated ore deposits were derived wholly from indefinite depths is a theory difficult of complete acceptance, in view of the persistent and extensive mineralisation usually encountered as incidental constituents of magmatic rocks usually closely associated with precious metal deposits. Anyone who has studied the precious metal deposits of our south-western states and territories, of Mexico, and especially on the great Andean region of Central and South America, must have been impressed by the highly mineralised character of the accompanying igneous rocks. To assume as probable a leaching of the metallic minerals contained in such rocks by aqueous solutions circulating laterally through them, by capillary attraction in

the massive, and seepage and flow in the fractures, followed by a subsequent deposition of the metallic burden in the adjacent voids or by replacement of rock and associated minerals, seems but a natural and logical conclusion. It is true that with the exception of iron the amount of metal found by analysis in such rock is usually exceedingly small, but we must realise that the volume of these rocks is very great compared with the size of the ore deposits, and that time reckoned by the geologic calendar is very long. The old German miners recognised the value of pyrite as an indication of the proximity of ore; they gave the name "fahlbands" to zones or belts of pyritised country rock, and observed that fissures intersecting such zones are usually locally enriched. Among the minor causes of enrichment of ore deposits near the surface is the mingling of solutions from cross fissures. Van Hise attributes the principal cause of ore shoots to them, and it is indisputable that at such intersections bonanzas or local enrichments in deep lodes are necessarily dependent upon such influences, in fact, deep-seated ore shoots are generally characterised by comparative dryness. As a rule the deeper one goes the less water there is; in other words, it would seem in most instances that after a certain level has been passed the amount of water encountered varies in inverse ratio with the depth, the deepest workings being the driest. The most serious difficulties to overcome in deep mining are threefold—hoisting, high temperatures, and rock pressure. The mechanical problem of hoisting from depths of 5,000 feet is probably the least of these, and has been pretty well worked out in South Africa, and at the copper mines of Lake Superior. When such shafts depart from the vertical in part of their course the best practice seems to be to hoist in stages. The normal increase of rock temperature with depth is a more serious matter, although so far it has been capable of control, for while there is a steady rise of something like 1° Fahr. for each 208 feet (beginning with an average of 60° Fahr. at surface) of depth in the South African gold mines, and 1° Fahr. for each 103 feet in the Lake Superior copper mines, good ventilation overcomes much of the discomfort from this source. The increase of rock pressure in deep workings is probably the most serious difficulty of all, one likely to make the methods of supporting the roof increasingly costly with depth. It seems likely that steel and concrete and especially waste rock filling may be used in such instances to marked advantage, where in higher levels timber would suffice. One thing is certain that in most cases, whatever methods are adopted, the expense is likely to increase out of all proportion to the profits. Moreover the outlook for a decrease of cost in this respect is not hopeful, unless it be in the direction of flushing with tailing and sand and fine dump material. These methods or at least schemes of a somewhat similar character have been carefully studied and used in the anthracite coal district of Pennsylvania and in the gold mines of the Transvaal.

Rooiberg Minerals.

The following are particulars of the estimated results of operations on this company's property for the month of December: Stamps, 10; days run, 29-809; tons milled, 2,935; concentrates, 105 long tons; average assay value metallic tin, 69-88 per cent.; estimated profit, £9,037 1s. 1d.; adjustments in respect of previous shipments due to fluctuations in the price of tin to be added in respect of August shipments, £753 12s. 1d.; net profit for month, £9,790 14s.; net capital expenditure, £705 14s. 1d. The concentrates in reserve at December 31, 1912, amounted to 17-38 long tons (2,240 lbs.) of the net value of £1,616. The sum of £2,206 9s. 4d. has been included in working costs for the month in respect of shaft sinking, exploration and mine development. Tonnage milled includes 1,233 short tons sands re-treated.

TANGANYIKA CONCESSIONS.

Official Statement—The Smelting Operations—Present Position of the Concern.

A CIRCULAR has been issued to the shareholders stating that as the general meeting of the Union Minière du Haut Katanga was held in Brussels on the 2nd December last, the directors are now in a position to give the shareholders an extract from the speech made at that meeting by Mr. Jadot, giving particulars of the smelting operations and other work carried out by that company in Katanga. Mr. Jadot said:—"At the Star of the Congo Mine the mining work is in full development, and the discoveries made in the shafts that have been sunk below water-level (30m. below that level) are very encouraging. At the Kambove Mine, where I described to the meeting of May 10 last the important tunnelling work that had already been executed (850m. of tunnels and cross-cuts, with open cuttings giving access), we have commenced making the necessary installations for an extensive working of this mine. This work is being pushed on as energetically as possible, and we hope it can be completed within a short time after the railway from Elizabethville to Kambove is open for working. The other mines will be developed and work commenced on them as the railway advances. Work has already been commenced on two of these intermediate mines. The following figures will enable you to form an opinion as to the progress realised since the beginning of our tests of the water jacket furnace:

Periods of Smelting Work.	Quantity of Ore Treated.	Average of Copper.	Production of Bar Copper.		Coke Consumed.	
			Total.	Pure Copper.	Per Ton of Total Copper.	Tons.
Year 1911 (Aug. 4 to Oct. 23). 88 days working ...	10,341	12 to 13	996	90	3,434	3·44
Year 1912 (Jan. 3 to April 11). 79 days working ...	10,053	13 to 15	1,002	95	3,249	3·24
Year 1912 (Sept 25 to Nov. 25). 61 days working ...	7,660	10	1,038	95	2,730	2·65

" Not being in possession of the accounts relating to the present smelting campaign, which so far has only lasted two months, it is very difficult, and even somewhat im-

prudent, to quote figures at this time. Nevertheless, wishing to give satisfaction as far as possible to the desire of the shareholders, I will tell you that, according to cabled information received for the month from October 15 to November 15 last, the cost of production per ton of bar copper, containing 95 per cent., at the works may be put at 800f. not including general European expenses. This price of 800f. per ton, which does not take into account stoppages and sundry accidents, which are always possible, will, on the other hand, be considerably reduced, we hope, in consequence of the two furnaces working, of the use of washed coal, of the manufacture of coke by our ovens at the works, the briquetting of the fine ore, and by the normal and regular concentration of the ore by means of a final installation of sorting and washing plant. Before incurring the considerable expenditure necessitated by industrial tests on a large scale, which were to be made to enable us to decide definitely as to the practical value of the électro-metallurgical process, we formed the opinion that it was indispensable to obtain the approval of the Comité Special du Katanga as to the scheme for the formation of a subsidiary company eventually to carry out our electric programme. We have already been for a long time in negotiation on this subject with the Comité Special du Katanga, and we hope soon to arrive at an agreement."

The circular states that the total receipts of the Rhodesia-Katanga Junction Railway and Mineral Company (Limited) for the nine months ended September 30 last show a balance in excess of expenditure of £26,698 on the working of the line. Smelting operations at the Kansanshi Mine were restarted at the end of June last, and the total amount of copper produced and shipped since that date is about 370 tons. With regard to the Benguella Railway, the opening of the line to Huambo, a distance of 430 kilometres from Lobito, was inaugurated on October 21 last by the Governor-General of Angola. From cables and letters received from Africa, the railway receipts for the ten month ending October, 1912, amounted to £78,217, and the expenditure £59,911, or a profit on the working of the line for that period of £18,306. The African manager of the railway company has just submitted an estimate for the working of the line for 1913, in which he states that he expects the receipts for working the portion of the railway already finished will amount to £113,063, and expenditure to £75,318, leaving an estimated profit on the working of the line of £37,748.

Brakpan Mines.

Following are particulars with respect to the December output of the Brakpan Mines:—Stamps working, 150; running time, 30 days; ore crushed, 59,408 tons; tube mills working, 8; ore hoisted, 67,158 tons; ore from dump, 1,430 tons; waste sorted, 14·77 per cent.; fine gold declared, 21,428 ozs.; value declared, £90,284, equal to 30s. 5d. per ton milled; working costs, £49,051, equal to 16s. 6d. per ton milled; working profit, £41,233, equal to 18s. 11d. per ton milled.

Jumpers-cum-Treasury.

The following cable was dispatched to the London agency of this company on the 7th May:—"The following is the result of the joint working of the Jumpers and Treasury mines during last month: 60 stamps, working 25 days, crushed 6,000 tons, yielding 1,717 ozs. fine gold from mill, 874 ozs. fine gold from tailings by cyanide, 279 ozs. fine gold from current slimes, and 279 ozs. fine gold from accumulated slimes; total from all sources, 3,218 ozs. fine gold. Value of the output, £13,514. Joint profit for the month, £2,137. Position of joint gold reserve at end of month, 529 ozs. of fine gold."

Manicaland Output.

The mineral output of the Territory of the Companhia de Moçambique (Manicaland) for the month of November, 1912, was as follows:—Reef: Mill—Gold won (fine gold), 66 ozs. 5 dwts. 14 grs.; tons crushed, 228 tons, value £278 6s. 9d.

Rand Klip.

The undermentioned developments for the month of December, 1912, have been cabled to the London office of the company:—First level east: Footage sampled, 35; value, 3½ dwts.; width, 44 ins. First level west, winze No. 1: Footage sampled, 50; value, 3½ dwts.; width, 16½ ins. First level east, Winze No. 1: Footage sampled, 100; value, 2½ dwts.; width, 13 ins. Main winze: Footage sampled, 30; value, 28½ dwts.; width, 8 ins. Main winze: Footage sampled, 60; value, 33 dwts.; width, 20 ins. Main winze: Footage sampled, 90; value, 1½ dwts.; width, 10 ins. Second level west: Footage sampled, 95; value, 1½ dwts.; width, 18 ins. Second level east: Footage sampled, 95; value, 2½ dwts.; width, 20½ ins. First level west: No footage sampled; quartzite in face.

ORIGIN AND ACCUMULATION OF OIL.—II.

The Result of Faulting in Oil Areas—Complicated Condition in the Californian Field—Oil in a Synclinal Basin.

In his review of the various theories regarding the origin and accumulation of oil, Marius R. Campbell refers to the curious phenomena of the salt mounds in the Texas Saline Oil Fields, and remarks:—"The history of oil development in this country has been full of surprises to those who held preconceived notions that all oil fields were constructed on the same general plan." The conditions of the Californian Oil Fields are of special interest as showing important geological features which made it necessary for the earlier geologists and drillers to modify impressions gained in the Appalachian areas.

THE CALIFORNIAN OIL FIELDS.

"Naturally, many of the traditions and scientific theories of the Appalachian oil fields were carried to California when prospecting was begun in that state some thirty-five years ago," remarks Mr. Campbell, "but so far as structural conditions are concerned little similarity could be observed between the nearly flat-laying conformable beds of the eastern fields with their fairly regular oil sands and the greatly folded, badly fractured and generally unconformable rocks of the Pacific Coast. . . . In the Appalachian region, as also in all other oil fields, in hard rocks, it has long been recognised that faults provide means of escape for both oil and gas, and that even closely appressed folds are not likely to retain either of these substances. Cooper found that in the soft Tertiary rocks of California, faults instead of affording avenues of escape for the oil, in many places seal themselves and act as barriers. His statement is as follows: 'If an oil-bearing bed ascending to the north be interrupted by an east and west fault the further ascent of the oil northward will be arrested and then an abundant supply of oil may be obtained by boring on the south side of the fault.'

Selvage frequently occupies the line of faults generally caused by the movement of the two sides of the fault on each other which have ground up the materials of the rock, forming a sheet of matter impervious to the flow of oil or water. . . . It seems probable that the sealing of rocks along a fault line is due rather to the amount of clay contained in the rocks which under extreme pressure becomes plastic and is spread out evenly over the cut edges of the country rock, but that as it may, the recent history of the oil fields of California seems to indicate that in places faults do constitute barriers to the progress of the oil. Cooper also seems to have realised, even before the idea was thought of in the eastern fields, that the water level in the rocks may have changed during geologic time, for he says: 'When the underlying water which supports the oil is released by the uplift of a formation above the permanent water by orogenic movements the water leaves the formation and the oil drains into the void formerly occupied by the water. . . .' The men who have contributed most to a knowledge of the conditions prevailing in Californian oil fields are Ralph Arnold, Robert Anderson and Harry R. Johnson. While the principal part of their work has been of such a recent date that there has been little opportunity for its verification, still the results have been of inestimable value to the practical oil man and presumably the principles upon which it is based are sound or at least mainly correct. In attempting to sum up the really important scientific results obtained by Arnold, Anderson and Johnson, one is handicapped by the lack of discussion in their reports of the causes and conditions which have led to the formation of oil pools. This in part is doubtless due to the great complexity of the problem, to the natural conservatism of the authors, and to the demand on the part of the general public for information on specific fields without regard to the principles that have governed their formation. The scientific contributions of these authors may be summed up as follows:

Cause of migration of oil through the rocks.—In view of the lack of evidence regarding the presence of water and its effect as a medium for the transference of oil, they arrive

at the tentative conclusion: that 'This migratory faculty may be ascribed entirely to the presence of the associated gas which would cause the oil to fill every crevice offering a point of escape or a point of lodgement.'¹ On this hypothesis the oil would move in the line of least resistance which in almost all cases would be upward toward a surface outlet. In another report they refer to diffusion as a possible mode of movement of the oil: 'This cause (of the migration of oil from its source) . . . (is) the tendency of oil to migrate by diffusion through certain media such as dry shales.' These do not necessarily interfere with one another and both may have affected the migration of the oil. The same may be said of water, if it can be shown that water is contained in quantity in any of the oil-bearing sands. *Conditions affecting migration.*—In most fields water is ruled out as an active cause of movement of the oil and consequently the modifying conditions of structure and water level so important in the saturated and folded sands of the eastern fields have little or no effect here. The conclusion is that ' . . . the condition of the rocks is the chief factor that controls the matter of where the oil is stored most abundantly.' If this idea is correct the oil may pass more readily through coarse porous sandstone, fractured denser rocks, and may even migrate from one formation to another where two sandy beds are in unconformable contact. Barriers against migration are usually formed of dense impervious rocks, but in certain places 'The residual or heavy hydrocarbons that are left upon evaporation of the lighter substances originally in the contained petroleum, seal the outcrops and hinder or prevent the escape of the oil from below.'² In the East such a condition is hardly possible but with the heavy oils of California it is of comparatively common occurrence. *Reservoirs.*—In the Appalachian oil field the reservoirs holding the oil are sandstone, and consequently the term 'sand' has come into common use in this sense. In the California fields, many of the sandstones are oil-bearing, but Arnold and Anderson 'Have come to the conclusion that in this region many of the "oil sands," so called, are not true sands, but zones of fractured shale or flint offering interspaces in which the oil can gather.'³ *Relation of Oil Pools to Structure.*—In many of the fields of this state anticlines are marked by accumulations of oil. This has led to the belief by many that the anticlinal theory applies here as well as to the eastern fields. The explanation given by the authors mentioned above is that since it is uncertain whether or not the rocks of the Californian fields are saturated with water it is doubtful if the anticlinal theory applies and, to use their own language, 'Large accumulations in anticlines may be accounted for primarily by the cavities offered by the strata along upward folds, and secondarily by the presence of less pervious beds arching over such folds and affording favourable conditions for the confinement of oil and gas tending to escape.' The geologic conditions in the California fields are so complicated that it is extremely difficult to formulate general laws regarding the migration or occurrence of oil and gas, but the important point seems to be the recognition that in such soft and slightly indurated rocks the conditions in many cases are directly contrary to those pertaining to more brittle rocks. Owing to the complicated conditions it is doubtful if the laws governing the movement of the oil and the full effect of local conditions will ever be thoroughly understood.

COLORADO FIELDS.

Many small oil fields have been discovered in the Rocky Mountain region, but in most cases the geologic relations are the same as they are in the Appalachian region, and so far as the writer is aware none of them presents exceptional or anomalous features except the Florence field of Colorado. Many eminent geologists have examined this field during the

past twenty years, but no one has offered a satisfactory explanation of the occurrence of oil in the basin-shaped depression which marks this field. Recently the field was studied by Mr. Chester W. Washburne, who as the result of this work offers the most rational explanation that has yet appeared. The Florence oil pool occupies a synclinal basin of Pierre shale lying just east of Canon City. According to Washburne the wells are drilled in shale throughout their entire depth. Previous writers have assumed that there must be some porous beds that act as reservoirs despite the fact that no such beds are known in outcrop and there is no constancy in the oil-bearing zone which extends throughout a thickness of fully 2,500 feet. Washburne's conclusions are somewhat unique, therefore liberal quotations will be made from his report. Regarding the range of the oil-bearing beds he says:⁷ 'The upper surface of the productive zone is in places roughly parallel to the dip of the beds, but the upper surface of the zone in which traces and unprofitable amounts of oil and gas are found is in general nearly horizontal lying from 750 to 1,000 feet deep. The highest traces of oil and gas are reported at about this depth for the entire distance across the field, notwithstanding the fact that the Pierre shale descends 1,600 feet in that distance. The oil does not follow any bed or series of beds in the shale. As shown by the outcrop, the oil zone does not contain any sandstone or other porous beds capable of acting as reservoirs. The oil lies in joints and fissures. This statement is made without reservation, because the writer believes that it is fully justified by considerations which cannot be presented fully in this brief paper. The evidence consists of: (a) observations on the correspondence in direction of the major joints observable in the rocks at the surface with the alignment of wells which have interfered with each other; (b) the fact that many wells have been drilled within a few feet of each other without encountering oil at the same depth; (c) the fact that gas struck in a shallow well often immediately ruins an adjacent well several hundred feet deeper by tapping the source of pressure; (d) the fact that many wells drain adjacent wells that are very much shallower; (e) the indications of vertical connection between the oil bodies shown by the marked increase in maximum pressure with depth; and (f) the dissimilar pressures in adjacent wells of the same depth. Corroborative evidence is furnished by the drillers, who report 'crevices' in most of the wells. . . . In numerous cases, . . . large quantities of water have been poured into a well without moistening the shale sufficiently to enable drilling to proceed, and the conclusion of

the drillers that the water has been used up in filling a crevice is probably correct. Less certain are some other observations, such as the reported dropping of the tools as much as 20 feet beyond the distance drilled. . . . In this connection the following report of the United Oil Company's well No. 42, is interesting. 'Bad crevices were found at 2,300 feet and the bailer was lost in one of these larger crevices, but it did not interfere with the drilling, as the crevice was large enough to allow the bailer to be driven into it without interfering with the work.' Much additional evidence on the presence of fissures and the part they play in furnishing reservoirs for the oil is presented by Washburne but space and time will not permit of its presentation here. With regard to the agencies which have caused segregation of the oil he writes as follows:⁸ 'The concentration of the oil has probably been brought about by water, which is able to shove the oil before it on account of its greater capillary pressure, due to greater surface tension. . . . The oil is hemmed in above by the ground water, and below by artesian water in the Timpan limestone and subjacent sandstone of the Carlile. The ground water supersaturates the shale for a distance of 300 to 500 feet from the surface.' Washburne's general conclusion seems to be that in the Florence field geologic structure has had little or no influence on the movement or the accumulation of oil. The oil is present mostly in open fissures and it has been forced into them and held in its present position by water on the same principle that damp fuller's earth serves as an impassable barrier to the oil. This view certainly does not correspond with those of previous workers in this field and time may show that it is erroneous, but in the opinion of the writer it is well supported by facts and probably in the years to come it may be regarded as the only tenable hypothesis.

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1. "The Genesis of Petroleum and Asphaltum in California," California State Mining Bureau, Bull. No. 16, p. 21, December, 1899.
2. Op. cit., p. 54.
3. The quotations given in this summation are taken from "Geology and Oil Resources of the Santa Maria District, California," Bull. U. S. Geol. Survey 322, 1907, p. 73-74.
4. "Preliminary Report on the Coalinga Oil District, California," Bull. U. S. Geol. Surv., No. 357, p. 113, 1908.
5. "Geology and Oil Resources of the Coalinga District, California," Bull. U. S. Geol. Survey No. 398, 1910, p. 186.
6. Loc. cit.
7. "The Florence Oil Field, Colorado," Bull. U. S. Geol. Surv. No. 381, pp. 521-522, 1910.
8. Op. cit., pp. 523-524.

The Dressing of Tin Ores.

Mr. Fischer Wilkinson, who was for a short time principal of the Camborne School of Mines, states in his paper "On the Dressing of Tin Ores in Cornwall," which was discussed at the Institute of Mining and Metallurgy, and from his own experience at the school mine, the actual extraction to-day throughout Cornwall is between 50 per cent. and 60 per cent., "this great reduction on previous estimates being due to the abandonment of the vanning shovel and the substitution of the chemical assay." Later on in his paper the author remarks that the practice of calculating recoveries by the vanning shovel assay is by no means obsolete in Cornwall; "indeed, it is the usual method," but he adds, "the chemical assay is being introduced on several mines. . . . The mine ore may still be vanned for the sake of economy, but the vanning error is determined, and the vanning figures corrected accordingly." In order to test the value of the vanning shovel assay the author submitted several samples of ore to some of the most experienced millmen in Cornwall, and compared their results with the chemical assay. The recoveries varied between 22 per cent. and 95 per cent., the vanning shovel being the least accurate on poor tailings and nearer the truth on ore containing coarse cassiterite. With regard to the losses incurred in the dressing of tin ores, Mr. Wilkinson remarks that it is unfortunately impossible to give precise figures, because the mining companies hardly ever state the original value of the ore. All they do is to give the recovery, and that in terms of black tin, which has no definite value. "The usual information given is that the produce (or yield)⁹ has been, say, 40 lbs. per ton. To those unfamiliar with Cornish ways, it may be well to point out the inaccuracy and ambiguity of this statement. The 'per ton' means per ton of 2,240 lbs., Cornwall not having come into line with the rest of the world in using the 2,000 lb. ton. The '40 lbs.' means 40 lbs. of concentrate containing an indefinite amount of tin (probably from 60 to 70 per cent.), and an indefinite amount of water (from 1 to 10 per cent.), and is part of a ton of 2,300 lbs., the smelters' weight when purchasing concentrates. Hence the produce is always understated by 26 per cent. Thus, if 100 tons of ore

were mined and two tons of concentrates sold, the mine would say that the produce—that is, yield—was:

$$\frac{2 \times 2,240}{100} = 44.8 \text{ lbs. (of concentrates) per ton (2,240 lbs.)}$$

omitting the words or figures in brackets, whereas it should be:

$$\frac{2 \times 2,300}{100} = 46.0 \text{ lbs. per ton.}$$

Evidence of recoverable tin going away from the mines is to be found in the tin caught by the tin streamers who re-work the tailings of the mines. According to the Home Office statistics, the value of the tin recovered by streamers for the period 1905-10 amounted to about 9 per cent. of the value of the tin sold by the mines. There are no figures available to show what the streamers lose.¹⁰ Mr. Wilkinson considers that "the first step towards improving the recovery is to see that reliable figures are kept of the value of the ore. The vanning assay should be abandoned, and records based on the wet assay and tin metal. The method of reporting the produce or yield in terms of black tin should likewise be changed. The publication of accurate figures as regards the yield and cost of working would be sure to set up a healthy rivalry amongst millmen which could hardly fail to produce improved results. Proper attention to statistics would show where the greatest losses were being made, and in what direction improved or new machines were wanted. The main reason for the present low recoveries is probably not because the machines or plant are defective, but because the dressing of the ores is not carried far enough, tailings which could be profitably treated being allowed to go to waste."

THE DECEMBER OUTPUT: GROUP RETURNS.

Features of Month's Work Reflected in Figures.

Rand Mines Group.

The following are the results of crushing operations of the Eckstein companies of the Rand Mines, Ltd., for December:—

Company.	No. of Stamps.	Tube Mills.	Tons crushed.	Estimated Working Costs per ton.	Total Fine Ozs.	Total Estimated Profit.
Modder B. ...	80	5	34,130	16/ 6	14,937	£34,612
New Modder. ...	180	7	50,500	19/ 2	24,354	53,519
City Deep ...	150	9	39,400	25/ 0	18,306	27,359
Village Deep ...	180	7	50,800	19/ 9	17,326	22,600
Village Main Reef ...	220	6	41,500	18/ 1	19,676	44,843
Robinson... ...	250	6	47,500	15/10	24,965	66,997
Bantjes	95	3	27,200	22/10	8,910	6,177

Totals & averages 1155 43 291,030 19/ 5 128,471 £256,107

The declared estimated monthly profits for 1912 are:—January, £221,326; February, £213,242; March, £373,426; April, £225,284; May, £243,784; June, £231,590; July, £229,719; August, £255,747; September, £245,942; October, £246,000; November, £230,721; December, £256,107.

New Modderfontein.—Increased profit, £14,695. Due to improvement in grade of ore milled. A large number of stope faces gave unusually high values. Tonnage milled showed an increase of 2,500 tons.

City Deep.—Native labour is urgently required at this time.

The following are the results of crushing operations of the subsidiary companies of the Rand Mines, Ltd., group for December:—

Company.	No. of Stamps.	Tube Mills.	Tons crushed.	Estimated Working Costs per ton.	Total Fine Ozs.	Total Estimated Profit.
Rose Deep ...	300	7	68,500	16/ 4	22,096	£36,865
Geldenhuys Deep. ...	300	7	49,500	26/ 7	18,091	9,938
Nourse Mines ...	260	7	48,600	22/ 0	17,596	20,268
Ferreira Deep ...	250	7	54,660	20/ 0	27,050	58,861
Crown Mines ...	660	26	175,000	17/ 3	65,365	124,000
Durban Rood. D. ...	100	3	25,150	24/ 3	8,878	6,657

Totals & averages 1870 57 421,410 19/ 6 159,076 £256,589

The declared estimated monthly profits for 1912 are:—January, £206,122; February, £209,989; March, £287,731*; April, £224,289; May, £238,284; June, £242,288; July, £241,295; August, £220,285; September, £220,890; October, £237,227; November, £237,210; December, £256,589.

Neumann Group.

The following are particulars of the results achieved by the crushing companies in this group during last month, viz.:—

	TONS.	YIELD.	PROFIT.
Witwatersrand Deep ...	37,490	£51,952	£18,464
Wolhuter	27,600	36,233	12,473
Consolidated Main Reef ...	18,997	33,850	12,709
Main Reef West	17,144	25,675	5,708
Knight Central	26,000	30,147	4,927

Total for group, £54,281

The Albu Group.

The following information regarding last month's operations of the producing mines of the Albu group is published:

Company.	Stamps.	Tube Mills.	Tons Crushed.	Total Cost.
Aurora West	80	—	13,945	£13,897
Cinderella Consolidated ...	80	3	19,310	22,912
Meyer and Charlton ...	75	2	14,188	12,535
New Goch	120	4	28,150	21,221
Roodepoort United ...	50	4	30,550	27,168
Van Ryn	135	6	39,700	30,111
West Rand Consolidated ...	100	4	30,200	36,014
	640	23	176,043	£163,858

Company.	Cost per Ton.	Total Revenue.	Profit.
Aurora West	19/11·2	£18,513	£4,616
Cinderella Consolidated ...	23/ 8·7	26,924	4,012
Meyer and Charlton ...	17/ 8·0	31,082	18,547
New Goch	15/ 0·9	27,263	6,042
Roodepoort United ...	17/ 9·4	29,876	2,708
Van Ryn	15/ 2·0	54,882	24,721
West Rand Consolidated ...	23/10·2	45,423	9,409
		£233,913	£70,055

Barnato Group.

The following are the results of operations for last month on the producing mines of the Barnato group:—

COMPANY.	STAMPS.	TONS.	REVENUE.	PROFIT.
Consolidated Langlaagte .	90	37,500	£51,943	£15,930
Ginsberg	80	14,460	21,486	7,612
Glencairn Main Reef ...	160	22,000	16,977	3,250
New Primrose	160	25,100	35,736	19,456
New Rietfontein ...	120	15,590	19,491	3,533
New Unified	60	11,775	16,816	5,176
Quest	30	3,006	2,871	344
Witwatersrand	220	37,980	47,514	22,082
December totals ...	920	167,411	£212,834	£77,392
November totals ...	920	164,388	£209,349	£73,339

The monthly gross profits for 1912 are:—January, £59,227; February, £58,273; March, £61,223; April, £63,336; May, £66,133; June, £67,467; July, £68,311; August, £69,525; September, £69,611; October, £71,089; November, £73,339; December, £77,392.

Consolidated Gold Fields Group.

The following are particulars in regard to the outputs and profits for last month of the undermentioned companies of the Consolidated Gold Fields group:

Company.	No. of Stamps.	Tube Mills.	Tons Crushed.	Gold declared.	Total Profit.
Simmer and Jack ...	320	7	75,000	20,804	£47,068
Robinson Deep ..	140	9	56,800	17,504	29,998
Knights Deep ...	400	9	108,100	18,997	22,120
Simmer Deep ...	140	8	52,950	11,395	6,385
Jupiter	105	7	40,650	9,936	6,412
Sub Nigel	30	1	4,492	2,295	3,239
Totals	1135	41	337,492	80,931	£115,222

The "total profit" shown above includes sundry revenue, viz.: Simmer and Jack, £2,500; Robinson Deep,

£347; Knights Deep, £274; Simmer Deep, £591; Jupiter, £166; Sub Nigel, £374; total, £4,252.

Reserve Gold.—Simmer and Jack, 1,155 ozs.; Robinson Deep, 1,500 ozs.; Jupiter, 1,250 ozs.; Sub Nigel, 900 ozs.; total, 5,105 ozs.

Knights Deep.—Of the total profit, £2,949 must be deducted in terms of circular to shareholders, dated 26th September, 1912.

Robinson Deep.—In addition to the above, 80 ozs. of gold were obtained from the old mill plates, the proceeds of which, viz., £334, have been placed to Renewals Fund.

Kleinfontein Group.

Appended are particulars of the results of operations on this company's property for December, 1912:—Kleinfontein Group—monthly results:—New Kleinfontein Company, Ltd.: Stamps, 210; days run, 30/334; tube mills, 4; tons milled, 51,400; gold recovered—fine ozs., 16,6191.906; net value, £70,419 17s.; profit, £24,642 8s. 7d.; working costs (excluding development), 16s. 5.691d. per ton; development to working costs, 1s. 4.057d. per ton; total working costs, 17s. 9.748d. per ton; capital expenditure, £2,331 2s. 11d.

Goerz Group.

Results of operations of the crushing mines comprising the Goerz group for last month are:—

COMPANY.	STAMPS.	TUBES.	TONS.	VALUE.	PROFIT.
May Consolidated	100	—	14,980	£14,835	£4,091
Princess Estate	60	5	21,500	27,841	1,907
Lancaster West	100	3	21,300	21,490	*
Geduld	50	2	14,450	19,190	4,861
 Totals	310	10	72,230	£83,356	£10,859

*The Lancaster West made a net loss of £2,343.

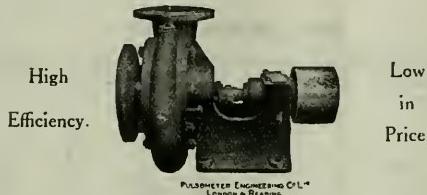
Roberts Victor Diamonds.

Washing operation were resumed on the 23rd December. Up to the 31st December, 4,907 loads of ground were washed yielding 1,553½ carats of diamonds; there were also recovered 572½ carats of diamonds from second sorting during the time washing operations were suspended.

Orange Diamonds.

In moving the adoption of the report and balance sheet at the annual meeting of the O.F.S. and Transvaal Diamond Mines on Monday, the Chairman, Sir Jan Langerman, M.L.A., said: At previous meetings of the company I explained that the directors held the opinion that if sufficient money could be obtained to develop the mine at greater depth, it would be advisable to mine and float about a million loads of blue ground drawn from all parts of the mine, and, after allowing the ground to thoroughly pulverise, to start washing operations on a large scale, so that the mine should undergo a thorough test as to its true value. A scheme to raise £100,000 by the issue of debentures was submitted to shareholders, and at our last meeting you were advised that, notwithstanding Sir Joseph Robinson's offer to take up one-half of the debentures provided the shareholders subscribed the other half, the appeal to shareholders had not met with adequate response, and the proposed issue had in consequence to be withdrawn. This the directors regretted, because they felt confident that if shareholders had assisted them to carry through the scheme the property could have been made a paying proposition in view of the valuable nature of the diamonds found in the mine. I also told you that, as the efforts of the directors to raise the money had failed, nothing further could be done for the present towards carrying out the work proposed by the directors; consequently no work has been done in the mine during the past year, but prospecting is being carried on at your property—which, as you know, consists of three thousand and fifty acres of freehold land—and also on areas adjoining your property. The directors will, however, make another effort to obtain the requisite sum to carry out their ideas, especially as Sir Joseph Robinson is still ready and willing to provide one-half of the amount required. The buildings, machinery, and plant on the property have been maintained in good order, and the cash in hand amounts to £2,461 1s. 10d. The report was adopted.

CENTRIFUGAL PUMPS.

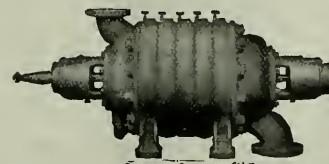


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Sixty stamps ran 28·710 days, crushed 17,100 tons, yielding 1,864 ozs. fine gold; 3 tube mills ran 28·655 days, yielding 793 ozs. fine gold; sands treated, 12,400 tons, yielding 1,182 fine ozs.; slimes treated 4,700 tons, yielding 380 fine ozs.; profit from operations, £2,579; sundry revenue, £714; working costs, 17s. 8d. per ton; total working expenses, £15,126.

Goerz Group.

Special general meetings of the Tudor Gold Mining Co. and the Van Dyk Proprietary Mines were held in Silesia Buildings this week for the purpose of altering the articles of association. Special general meetings of the Lancaster West, Geduld Proprietary and Modderfontein Deep Levels were also held for the purpose of drafting new articles of association. The special general meeting of the May Consolidated Gold Mining Co., Ltd., which was to be held this week, was adjourned for a week owing to the absence of the necessary representation.

Koffyfontein Diamonds.

The directors of the Koffyfontein Mines, Ltd., in presenting their annual report for the year ended June 30 last, state that the accounts show, after providing for maintenance and repairs to machinery, £15,917, and allowing for depreciation £20,794, making in all £36,711, that the balance of profit for the 12 months amounts to £4,868. The total profit in hand is £26,759. In addition, there is £37,505 to the credit of premiums account in respect of the issue of new capital in July, 1911. The number of carats recovered during the 12 months amounts to 80,984.

Rhodesian Section.

LATEST MINING NEWS.

A Sign of the Times—Buck's Reef—Charterland and General—The Bushman Mine—Chamber of Mines' Report—The New Found Out—The Hay Mine—Anglo-French Matabeleland—Bwana M'Kubwa Copper.

As an indication of the present depression in Southern Rhodesia, the following is of interest:—The sale of the mining property known as the Old Dog and Empire Mine, which was advertised to take place by Messrs. Boggie & Co., of Gwelo, a week ago, was withdrawn, as no reasonable offer was made. The mine, says the *Gwelo Times*, is an exceedingly promising one, and, notwithstanding that the sale had been advertised throughout Rhodesia and Johannesburg, no one seemed to have any money to invest in mining.

* * * * *

The report of the Bucks Reef for the quarter ended September 30 states:—"Loss, £1,303. Capital expenditure, £996. Tons crushed, 2,508; recovered from all sources employed per ton milled (fine gold), 8·06 dwts., or a total of 1,011 ozs. Payable ore reserves as at September 30, 1,720 tons. There is a certain amount of ore included in this statement which will be difficult to get out of the mine, whilst, on the other hand, there is a considerable quantity reclaimable from old stopes which is not herein included." Since this report was issued, the directors decided to close down the mine, which has since been let on tribute.

* * * * *

The report of the Charterland and General Exploration and Finance Company, Limited, for the year ended August 31 last states that the directors recommend the payment for the period of a dividend of 5 per cent., which will absorb £8,190, leaving a balance of £8,982 to be carried forward.

* * * * *

The following is a copy of a cablegram which was recently despatched from the Bushman Mine to the Board of the Bechuanaland Copper Co.:—"Footage sunk and driven for October—284 ft.; total 9,143 ft. Third level cross-cut No. 12 intersected "O" 3, 18 ft. wide average assay 7·3 per cent. Winzes 7, 8, 9 prove ore to exist between first and second levels." The London office reports sold 7½ tons of copper; average price £76 per ton produced from experimental plant.

* * * * *

In the course of their report for the month of November, the Executive Committee of the Rhodesia Chamber of Mines (Incorporated) state:—The following is a summary of the returns of native labourers employed on Southern Rhodesian mines during the months of September and October, 1912:

	September.	October.
Local	12,042	11,019
Portuguese Territory	6,865	6,019
N.W. Rhodesia	3,858	8,725
N.E. Rhodesia	5,176	5,347
Nyasaland	5,228	5,178
Other Sources	954	904
	38,623	32,192

The number of natives employed in October shows a decrease of 3,120 when compared with the corresponding month of 1911. The distribution during the months of August and September was as follows:—

	August.	September.
Producing Gold Mines	28,222	22,392
Non-producing Gold Mines	11,121	10,025
Coal and other mines	1,162	1,206
	35,505	33,623

Notification has been received from the Secretary for Mines that the Government are now prepared to accept the contention of this Chamber that Inspection Certificates issued on blocks of claims will include Inspections of excess areas. The Committee have requested that all payments of inspections, and footage declared on excess areas, in ignorance of the legal position as it has now been established, shall be rebated to claimowners.

* * * * *

The report of the New Found Out Mines to June 30, 1912, states that as development only is proceeding, no profit and loss account is shown. The question of the erection of the plant depends upon what financial arrangements can be made. The directors are now considering the whole position and hope at an early date to place a scheme before the shareholders under which the necessary funds will be provided. No difficulty has been encountered during the year in connection with labour. The supply has been ample at all times and the directors do not expect any serious difficulties in the near future. The engineer's report shows that the ore reserves at June 30 amounted to 51,000 tons, of an average value of 12·3 dwts., equal to £133,301.

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The report of the Hay Gold Mining Company for the year ended June 30 states that a profit of £8,297 was made. This amount has been added to the sum brought forward, making a total available profit of £16,269, and of this sum £7,500 has been added to the reserve fund, leaving £8,769 to be carried forward. The directors have taken advantage of the position of the reserve fund to write down the amount standing to the debit of the mine development account and main shaft expenditure, in view of the position of the mine. A sum of £7,300 has also been written off machinery, buildings, etc., in accordance with recommendations made by the engineers. During the year 20,345 tons were treated, yielding £26,451. Of this amount £7,572 was recovered from the treatment of the accumulated sands and slimes. On November 9 last the mill was closed down, the available ore of a payable grade having been exhausted. In the meantime exploratory work is proceeding on the advice of the consulting engineers with the hope of opening up further payable values.

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The profit and loss account of the Anglo-French Matabeleland Co. for the year ended May 31 shows a credit balance of £4,421. The available cash, or its equivalent, less sundry creditors, amounted approximately to £17,700 at the close of the financial year, as compared with about £12,700 at May 31, 1911. The directors have received from the manager in Rhodesia a valuation of the lands of the company based on the minimum price which the British South Africa Company is obtaining for similar lands. This valuation amounts to £78,992, as against the figure in the company's books of £13,544. The board has decided, for the purpose of the accounts to adopt this valuation, less 15 per cent., viz., £67,143, at which figure they are of opinion the land may safely be valued in the accounts. They have therefore decided to re-adjust this important item in the balance sheet and to write off against this increment the loss, £50,341, on the Penhalonga shares. The difference between the increase in this valuation and the loss on the Penhalonga shares, viz., £3,315, has been placed to the

credit of the profit and loss account. In addition to the foregoing the company holds an unlocated land grant entitling it to select about 6,000 acres of land free of cost. Owing to the difficulty in arriving at a value of the claims the directors have decided not to alter the book cost at which they stand. The directors have decided, after very careful consideration, to authorise a scheme for cattle ranching on the Belingwe Block and a beginning has already been made with the purchase of a number of cattle.

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The report of the Bwana M'Kubwa Copper Mining Co. for the year ended June 30 states that the expenditure on

development work, ore testing (including allowance for depreciation of machinery, plant, and buildings), amounted to £21,236, and the expenditure in London amounted to £2,568, while the receipts for interest and transfer fees amounted to £2,888. Since February last the operations underground have been confined largely to the preparatory work necessary to provide the output of ore required for the concentration plant, but it is the intention of the board to resume development work at depth when the mine has been equipped with permanent plant. Such operations will then be carried out at considerably less cost than is possible at present.

MINING MEN AND MATTERS.

Sir Joseph Robinson, Bart., arrives on the Rand this week.

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Mr. W. Hudson, of Gildersome Foundry, Leeds, is paying a visit to the Rand.

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The second annual dinner of the S.A. Institute of Electrical Engineers will be held at the Carlton Hotel, Johannesburg, on Friday evening, the 10th January, 1913. Tickets may be obtained from the secretary or any member of the Council, price 21s. each.

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After the 16th inst. the position of the Secretary to the S.A. Institute of Electrical Engineers will be held by Mr. W. J. Clarkson, whose address is care of the Central Mining and Investment Corporation, Limited, 812, The Corner House, Commissioner Street, or P.O. Box 4563, Johannesburg.

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The seventeenth annual general meeting of members of the Geological Society of South Africa will be held in the Council Chamber, Chamber of Mines, Johannesburg, on Monday, 20th January, 1913, at 8.30 p.m. Business: (1) To receive and consider the annual report and statement of accounts for the year ending 31st December, 1912. (2) To elect twelve members of council in place of Messrs. G. S. Corstorphine, J. Jervis Garrard, W. G. Holford, C. B. Horwood, W. A. Humphrey, J. P. Johnson, E. Jorissen, T. N. Leslie, Paul Range, J. H. Ronaldson, A. R. Sawyer, and P. A. Wagner, who retire under the rules of the society. (3) To elect a president, vice-presidents, and honorary secretary for the ensuing year. (4) To elect an auditor for the ensuing year. Mr. H. S. Harger will deliver his presidential address.

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This (Saturday) evening there will be special general meeting of the South African Institution of Engineers, at 8 p.m., in the Council Chamber of the Chamber of Mines, for the purpose of considering certain proposed alterations of the by-laws. Immediately on conclusion of this, the seventh ordinary monthly meeting will be held. At the latter Mr. H. B. Maxwell will reply to the discussion on the paper entitled "The Commercial Economy of Turbine Pumps." Mr. W. Pile will read a paper entitled "The Equipment and Operation of a Whaling Station." The discussion will be concluded on Mr. S. E. Boult's paper entitled "Electric Hoists in Headgears," and on Mr. R. B. Greer's paper entitled "The Margin of Safety Required for Man Haulage at Great Depths." The discussion will be continued on Mr. H. J. Holder's paper entitled "The Commercial Aspect of Municipal Electricity Supply Undertakings," on Mr. J. Brad Roberts' paper entitled "South African Corundum and its Uses," and on Mr. G. K. Chambers' paper entitled "The Braking of High Speed Winding Engines." Visitors interested will be cordially welcomed.

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The monthly meeting of the S.A. Institute of Electrical Engineers will be held on the 16th inst. Agenda: (1) Minutes of previous meeting. (2) The Council's third

annual report and the statement of accounts for 1912 will be submitted. (3) Declaration of election of officers and Council for 1913. (4) General business (appointment of auditor for ensuing year). (5) The president's (Mr. John H. Rider) valedictory address. (6) Discussion will be continued on: (a) "Some Practical Aspects of Electric Winding" (June-Sept. Journal), by Mr. S. E. T. Ewing, M.I.M.E. (member); "Practical Operation of Three-Phase Hoists at the Bantjes Consolidated Mines, Ltd." (June-Sept. Journal), by Mr. J. Askew (member); (b) "Notes on Some Modern Electrical Machinery" (Oct.-Nov. Journal), by Mr. F. H. Michell (member); (c) "Power as a By-Product" (Oct.-Nov. Journal), by Mr. J. W. Kirkland (member of Council); (d) "Electrical Distribution for Mines" (December Journal), by Mr. J. W. Anson, A.M.I.E.E. (associate member). (7) Paper for reading (if time permits): "The Education and Training of Engineers," by Mr. Norman Harrison, A.M.I.E.E., Chief Engineer, G.P.O. (member).

Performance of Stamps.

In the *Journal of the Chamber of Mines of Western Australia* for August, 1912, Mr. W. R. Degenbart gives details of the operation of a unit of two Holman pneumatic stamps working on a mixture of hard and soft ore. The screens are 12-mesh; horsepower consumed ranges from 30 to 34 h.p. per unit; drops per minute, 123 to 135; capacity of the unit, 130 tons per hour; consumption of shoes, 0.248 lb. per ton ore crushed; consumption of dies, 0.199 lb. per ton; weight of shoes, 224 lb.; weight of dies, 177 lb.; water used, 1,200 gal. per ton of ore crushed. By comparison with gravity stamps, the two Holman stamps excelled the performance of 15 gravity stamps.

Preparation of Samples.

Mr. W. B. Blyth calls attention to the necessity of proper preparation of mine samples, if the resulting assay is to be of value. His paper appears in the July, 1912, *Journal of the Chamber of Mines of Western Australia*. The main point to be observed is the size to which samples must be crushed before the successive quartering operations are performed. He gives detailed results of many assays on a variety of ores, the mine samples of which varied in quantity. The point is absolutely demonstrated that the samples considered must be crushed finer than $\frac{1}{4}$ in. before a representative portion for assay can be quartered for them. The results from working on the $\frac{1}{4}$ -in. product are so erratic that they are useless. The author advises that the size to which various ores must be crushed before the quartering process begins must be determined for each ore. But his general results on a wide variety of ores indicates that the required size lies somewhere between $\frac{1}{4}$ in. and 10 mesh. He advocates the use of a jaw crusher delivering a $\frac{1}{4}$ -in. product; a second crusher reducing to 10-mesh; and a disk pulveriser as best adapted to the proper preparation of samples.

MINING EXAMINATIONS.

Private individual tuition for Mine Managers', Mine Captains', Mine Surveyors', Mechanical Engineers' and Engine-drivers' Examinations. Practical Mathematics and Electrotechnics. Correspondence lessons where personal tuition is impossible.—E. J. MOYNIHAN, Consulting Engineer, 35 and 36 Cuthbert's Buildings, corner of Eloff and Pritchard Streets, Box 2061, Johannesburg.

Correspondence and Discussion.

Comments on Questions Arising in Technical Practice or Suggested by Articles in the Journal—Views, Suggestions and Experiences of Readers.

The Ridge Furnace.

To the Editor, *South African Mining Journal*.

Sir,—I beg to advise you that I have arranged for the formation of a private company to take over my patents in roasting, calcining and drying furnaces. This new company will be called the Ridge Roasting Furnace and Engineering Company, 62, London Wall, E.C.—Yours, etc.,

H. M. RIDGE.

62, London Wall, E.C.

17th December, 1912.

Valley Diamonds.

To the Editor, *South African Mining Journal*.

Sir,—In your note of December 28th last, on this flotation you say so far as you are aware this property has not been worked since the war, whereas it was floated in the last diamond boom in 1904, and under the management of James Leslie, was proved to be unpayable. Previous to that it was thoroughly tested and found to be unpayable by several parties. The diamonds from the fissure being of poor quality and small in size the returns from the alluvial must have been taken in error to get a value of 76s. 5d. per carat.—I am, etc.,

CHAS. MERRICK.

Box 5036, Johannesburg. January 6th.

National Diamonds.

To the Editor, *South African Mining Journal*.

Sir,—The attention of my board having been drawn to an article which appeared last Saturday in a certain weekly paper, in which reference is made to this syndicate, to the effect that (a) the reconstruction was carried through without reference to the Preference shareholders; and (b) "That no alteration to meet them appears to have been made in the articles of association," I beg the courtesy of your columns to reply that the reconstruction was carried through under the best legal advice obtainable; that the Preference shareholders were consulted at the meetings legally called for this purpose in the same manner and time as the ordinary shareholders, and that they agreed to the terms of the reconstruction which involved the reduction of the denomination of all shares from £1 to 10s. The rights of the Preference shareholders are clearly and fully secured by the terms under which the Preference shares were issued: and my board repudiates the assertion that the directors have disputed any of the rights of the Preference shareholders, nor have they issued any statement bearing on this question. With reference to the further allegation that the legality of the reconstruction can be questioned, we are advised that this is not so; that the legal position is perfectly secure. We further state for the information of all shareholders that the position of the syndicate is sound and satisfactory. Progress at the mine is excellent, and the prospects of the syndicate brighter than at any period of its existence.—Yours, etc.,

J. V. DUNLOP, Secretary.

Johannesburg, January 6th.

Rhodesia: A Further Condemnation.

To the Editor, *South African Mining Journal*.

Sir,—I was much interested in the account of an interview with a gentleman who has just returned from Rhodesia appearing in your last issue. As one who has also tried his luck in that much boomed country and "given it best," I should like to say a word or two in support of your informant's statements. Everything he says is perfectly true.

There is absolutely no money in the country and there is, as far as I can see, no prospect of anything in the nature of a return of prosperity; not for a long time to come at any rate. At last they have had a little rain around Bulawayo, but it has come too late to really benefit the farmers, who will have no crops. Small mines all over the country are either closing down or struggling with adversity in the shape of drought. As for the "big" mines, apart from the Cam and Motor, the Globe and Phoenix, the Falcon, the Lonely, and the Shamva, what is there in Southern Rhodesia that will be running at a profit in five years' time? The Chartered Company's administration is rotten. No real encouragement is shown either to farmers or prospectors. All sorts of handbooks giving glowing accounts of Rhodesia are distributed broadcast, and the average would-be settler only realises what a sorry assortment of inexactitudes are contained in these pamphlets after he has expended all his available capital in travelling around the accused territory after phantom farms or phantom mines. One is told that the climate of Rhodesia is salubrious and bracing and healthy and various other admirable things, which it distinctly is not. There is scarcely a district in Matabeleland or Mashonaland that is not a hotbed of malaria, and now, to add to the other joys of existence, sleeping sickness has crossed the Zambezi into Matabeleland. Of course, the Chartered Company say there is not the slightest risk of it spreading any further. Of course not! Of course, there was no chance of it spreading when it first crossed into Rhodesia about 1,000 miles north of the present most southerly "infected area"! I suppose the Chartered Company will soon be issuing their annual statement again and will refer in grandiloquent terms to prosperity and profits, etc. I wonder if shareholders realise where some of these so-called "profits" come from. I will mention just one source to show what methods the administration resort to to keep up this great Imperial farce. The Government Mining Engineer, although a servant of the State, is allowed to report for independent mining companies, and a large proportion of his fees go into Chartered coffers and help to swell the "profit"! Bulawayo and Salisbury are about the most expensive places on earth to live in. Personally, if I owned Gehennah and these towns, I should let both Salisbury and Bulawayo and I would lodge with Satan. I admit my views are "coloured by personal disappointment and bitterness" (as you put it in your last issue), still they are substantiated by facts, and I for one have no great longing ever to cross the Limpopo again.—I am, etc.,

EX-RHODESIAN.

Johannesburg, January 6th.

Employment for Phthisis Victims.

To the Editor, *South African Mining Journal*.

Sir,—Wouldn't less charity and more genuine help be more acceptable to the majority of sufferers from phthisis? I freely admit that honest criticism is only valuable when it is constructive, so that in criticising the efforts of the mining houses and Government one must offer a better solution than mere charity. Your broadmindedness will prevent any suspicion of offence being taken at my criticism by those best able to afford the help. Most of the sufferers in the early stage would be able to lengthen their span of life greatly if they were able to get another job on the surface—by surface I do not only mean mine-area—and in any other country but this there are numerous opportunities for such men to take up with the assistance of their wives and families, employment that would give them more than a bare living. One opportunity or opening, not available in this country, is that of news-seller. My own estimate of

the number of men or families that could find profitable employment at news-selling is, roughly, 1,000. An employment that would not only be profitable to the men directly concerned but also to the traders and public generally, particularly to the newspaper proprietors would it be profitable for where one newspaper or periodical is now sold, with ordinary means of circulating, or by following ordinary methods, at least double the number would be sold. This may seem rather extravagant to you, but it is an opinion formed by close investigation of the newspaper world in this country. But to make it possible the entire method of publishing as now followed here would have to be altered. To explain: There are thousands of people in this country who would buy both newspapers and periodicals if it were made easier for them to do so. And if the newspaper proprietors made it possible for individual people to get the papers reasonably, these thousands of people would buy the papers. Take your own paper as an instance: How many business men on the reef would buy it if it were delivered to their door each day of issue without their having to call in at some newsagent for it? It would not be very difficult for a man to solicit the order to deliver weekly and collect the payment each month. But just because it is not made easy they neglect to get the paper. A large number of the

sufferers from phthisis would be available for such employment and would gladly take it up, for it would then be lifted out of the class of work performed by natives as it now is. This letter merely touches on the subject, but it may give food for thought, not only to yourself and those interested in the subject of finding some means of helping the phthisis men but also to the general public and the newspaper proprietors. If the subject does find some welcome by your readers, I shall have pleasure in explaining how and why I have gained the experience—or would you call it knowledge—that there is a field in this country for employing men and their families in the way I outline.—Yours, etc.,

J. WRIGHT SUTCLIFFE.

January 6th, 1913.

ANSWERS TO CORRESPONDENTS.

"Westward Ho!" (Durban).—All three stocks are good investments and should improve in price with the general market.

New United Reefs (Sheba).

The directors of the New United Reefs (Sheba), Ltd., in submitting accounts for the 12 months to May 31 last, state that efforts have been made to let the property on tribute, but up to the present time no offer has been forthcoming, and the directors are taking steps with a view to the sale of the entire property.

The report of the New United Reefs (Sheba), Ltd., for the year to 31st May last, submitted at the meeting on the 19th ult., states:—Do Kaap property: The circular dated 16th February last reported that, owing to the difficulty of keeping the mill supplied with payable ore, instructions had been given to the manager to cease milling operations. Milling was, accordingly, stopped. Operations were then confined to development work, with a view to seeing whether payable ore could be located in the 563 ft. level. The board limited the expenditure to a moderate monthly sum, and the work was continued until the end of July, without, however, encountering payable ore. Efforts have since been made to let the property on tribute, but up to the present time no offer has been forthcoming, and the directors, feeling that it would be undesirable to continue the expense of a caretaker and the payment of claim licenses, are taking steps with a view to the sale of the entire property, machinery, plant, etc. Milling: During the eight months ended 31st January last 7,887 tons of ore were treated for a yield, including the subsequent general clean-up, of 1,812 ozs. of gold, valued at £7,381 12s. 3d. Plant and machinery: The plant and machinery at the mine have been kept in good order. Desire claims: In the circular of 16th February last extracts from the manager's report on these claims were given. The Board have since been approached by several parties with a view to taking these claims on tribute, and it is expected that a satisfactory arrangement will be arranged soon with one of the tributaries in question. It should be mentioned that the new railway from Nelspruit to Pilgrim's Rest will pass close to these claims, and will materially assist in the conveyance of supplies, etc. Cash resources: Pending the disposal of the property of the company in either of the ways above suggested, the board are keeping the cash resources in a liquid condition, and have reduced expenses as much as possible.

INVESTORS' DIARY.

The following company meetings have been announced:—
Jan. 24.—Witbank Colliery.

Situation Wanted.

Wanted by an energetic young man, strictly temperate (Blacksmith by trade), situation Surveyor's Office, or the like. Fair knowledge of Blow-piping, etc. Salary secondary consideration if prospects are good.

Apply—Macpherson, 31, Gale Street, Durban.

Contracts Open.

The South African Railways invite tenders for the following:—Pietermaritzburg—Steelwork for extension of machine shop (31st December, 1912). Electrical wire.—Due 31st December. Bags: Grain, coal, etc., 214,600.—Due 14th January, 1913.

The Germiston Municipality invites tenders for the supply of materials required in connection with the trackless tramways scheme, as follows:—(1) Rail-less cars and tower wagon; (2) cables, trolley wire, feeder pillars, spare wire, etc.; (3) converters, transformers, switch gear, etc.; (4) overhead fittings, ears, insulators, strains, frogs, crossings, etc.; (5) poles, bracket arms, scrolls, etc. (February 3).

The Secretary to the Tender Board, S.A.R. Headquarter Offices, Johannesburg, invites tenders for the supply of hardwood logs and planks (January 14).

The Secretary to the Tender Board, South African Railways, Johannesburg, invites tenders for the supply of 31,800 metallic filament lamps for train lighting purposes (January 21, 1913).

Tell advertisers you saw it in the *South African Mining Journal*.

Positions Vacant.

WANTED.

MANAGER for Coal Mine. Must have South African Certificate of Competency and good knowledge of Mechanical and Electrical Engineering. Salary, £500 per annum, with free quarters. Living moderately cheap. Applications, stating when duties can be commenced, with copies of testimonials, to be sent to The Standard Bank of South Africa, Ltd., Intelligence Department, Box 1031, Johannesburg.

WANTED.

A CERTIFICATED MINE SURVEYOR for Mine in Eastern Transvaal.—Apply, sending copies of testimonials and stating salary required, to X. Y. Z., c/o S. A. Mining Journal, Box 963, Johannesburg.

THE WEEK IN THE SHAREMARKET.

Improving—Brighter Prospects of Peace—Increasing Activity

THE improving prospects of peace are effecting a corresponding degree of cheerfulness in the sharemarket. Should the intervention of the powers be successful—as now seems probable—all markets would respond, and the beginning of the year may still be attended by considerable activity. Many Rand stocks stand at most attractive prices to-day, and are bound to go better in more favourable circumstances. Diamond and tin shares should participate in the improvement, the latter particularly, in view of the low figures they recently touched.

In Rhodesia, according to London advices, transactions have been on only a moderate scale. Charteredads are again hampered by sales against option positions falling in at the end of the month. There should, however, shortly be an accession of activity in the shares, for it is expected that next year will witness the development of a forward policy by the British South Africa Company. In this connection some importance is attached to the fact that Mr. Dougal Orme Malcolm has joined the Chartered Board. Mr. Malcolm has had twelve years' colonial experience, having served as private secretary to Lord Selborne in South Africa and as secretary to Lord Grey in Canada. Among Rhodesian gold shares some small recessions are shown, instances being Eldorados, Shamvas, Lonely Reefs, and Giant Mines (the last-named on the reduced dividend); but, on the other hand, Planet-Arcturus, Cam and Motors, and Falcons continue in fair request. Tanganyikas are the medium of some Continental inquiries, and the shares should benefit by the shipments of copper by the Union Miniere from the Katanga region, now coming forward to Europe.

	*	*	*	*		
	Friday, 3rd	Sat., 4th	Monday, 6th	Tuesday, 7th.	Wednesday, 8th.	Thursday, 9th.
African Farms	- 16 3B	15 3B	16 3	16 3B	16 6	16 6B
Aurora West	... 10 0B	...	10 0B	...	10 0	10 0B
Apex Mines	- 28 0B	25 6B	26 6	25 0B	27 6	29 0
Bantjes Consolidated	25 0B	23 6B	23 3B	23 0B	23 6	23 6B
Benonius	... 4 0B	3 9B	...	4 0B	4 0B	4 3B
Bushveld Tins	- 0 9B	0 9B	...	...	0 9	0 9B
Brakpan Mines	... 73 0B	...	80 0B	79 0B	78 0B	
Blaauwbosch	- 65 0	48 0	69 0	69 0B	72 0B	72 0B
Breyten Collieries	... 33 0B	...	33 0B	32 6B	31 0B	
British S.A.	... -	...	23 9B	26 9B	26 3B	
City and Suburban	- 41 0B	41 0	41 6B	41 6B	41 4B	42 0
City Deeps	... 60 6B	61 0	...	60 0B	61 0	60 0B
Cloverfield Mines	- 6 6	6 3B	6 3B	6 4	6 3B	6 6B
Cons. Langlaagte	- 23 9B	29 0B	28 9B	29 6	29 3B	29 6
Cons. Main Reefs	- 18 6	18 6	18 6	15 6	18 6B	18 9
Coronation Freeholds	0 6B	...	0 6B	0 6B	0 6B	0 6B
Cons. Mine Selections	... 14 0B	14 0B	14 0B	12 9B	14 0B	
Coronation Colls.	... 16 0B	16 0B	16 0B	16 0B	17 0B	
Cinderella Cons.	... -	...	...	19 0B		
Clydesdales	... -	8 6B	...	...	...
Crown Mines	... 135 0B	135 0B	135 0B	137 0B	138 9B	...
East Rand Cent.	... 11 3	11 0B	11 0B	11 0B	11 3B	11 6B
East Rand Coals	... 2 4B	2 4B	2 6B	2 4B	2 4B	2 4B
East Rand Deep	... 2 9B	2 9B	2 9B	2 9B	2 10B	2 10B
East Rand Props.	- 53 0B	...	54 0B	55 0B	55 0B	55 0B
East Rand Deb.	... -	£92 <i>1</i>	£82	£92 <i>1</i>	...	£92 <i>1</i>
Eastern Gold Mines	- 2 0B	2 1B	2 0B	2 1B	2 3	2 0B
Frank Smith Diam.	9 9B	10 9	10 6	10 3	10 0B	10 3
Govt. Areas	... 20 3B	20 3B	20 3	20 6	20 9	20 9
Glenoco (Natal) Colls	... -	...	6 6B	6 6B	6 6B	6 6B
Geduld Props.	- 22 6B	23 0	22 6B	22 9B	23 0B	23 0B
Hex Rivers	... -	2 3B	...	...	2 3B	2 4B
Jupiters	... 11 9B	11 9B	11 9B	11 9B	12 0B	11 9B
Klerksdorp Props.	3 0B	...	2 9B	3 0B	3 0B	3 0B
Knight Centrals	- 18 0B	12 9B	12 9	12 8	12 9B	12 6B
Kalfontein Diamonds	0 3	0 3B	...	0 3	0 4	0 3B
Luipaardsvlei Estates	... -	12 0B	...	...	...	...
	■ Buyers			■ Sellers		

Friday.	Sat.	Monday.	Tuesday.	Wednesday.	Thursday.
3rd.	4th.	6th.	7th.	8th.	9th.
4. 08	4. 08	3. 11a	3. 11	3. 11b	3. 10
ma 2 5	2 4b	2 5b	2 6	2 6b	2 5
18 08	15 9b	20 08	19 9s	19 6s	18 9
70 08	70 0	69 0s	70 0	70 1d	70 3
1 4b	1 4b	1 4b	1 4b	1 4b	1 3b
39 6b	..	39 0	38 6b	39 0b	39 6
7. 6b	8 0s	7 6b	7 6	7 5s	7 3b
19 3b	13 6b	19 6b	20 20	20 20d	21 20
8 3	8 0s	8 0b	8 0	7 9	7 3b
1 0b	1 0s	..	1 0b	1 0b	1 0
2 6b	2 7b	2 7b	2 7b	2 8b	2 9b
27 0b	..	..	..	30 6b	32 0
16 6s	..	13 0b	13 0b	13 0s	13 0
1 5b	1 5b	1 6b	1 7b	1 8	1 5b
49 0b	49 6b	49 6b	50 0	50 0b	49 6b
8 6b	..	8 0b	8 0b	..	9 8
6 3b	..	6 0b	..	..	6 0b
..	3 2b	3 2b	3 3	3 2	3 1b
29 6s	29 6b	29 6b	29 3b	30 0b	30 0
..	5 6b	..	..	5 9s	..
30 6	31 0	31 0	30 3b	30 3b	31 6
4 3b	4 6	4 3b	4 6	4 5	4 6
33 9b	40 0b	40 0b	42 6b	42 6b	42 6b
..	2 4b	2 9b	..	..	..
4 4	4 5	4 5	4 5	4 5b	4 4b
10 6	..	9 9b	10 0b	10 6	10 6
16 0b	1d 0s	1d 6	16 3b	16 3b	16 0
..	5 3s	5 3s	5 3b	5 3b	5 3b
34 0s	..	39 0b	39 0s	40 0b	40 0
52 0	51 0b	51 0b	51 3b	52 6b	52 4b
46 0b	46 0b	46 3	46 6	46 6	46 0
..	..	0 9b	..	..	0 9b
27 0b	..	28 0b	26 0b	29 0b	..
37 0b	37 6b	37 6b	37 6b	..	..
19 9b	19 6	20 0	20 6	21 0	21 3
40 6b	..	..	40 0b	..	40 0
1 0b	..	1 0b	2 0b	..	2 3b
2 6b	..	..	..	..	..
..	..	..	..	60 0b	..
18 0b	18 0b	18 3b	18 6	18 6	18 0
51 0b	50 0b	50 0b	50 0b	51 6b	51 6b
45 0b	45 0b	45 0b	45 0b	45 0b	45 0b
3 6b	3 6b	3 6b	3 0s	3 6b	..
15 6b	16 6b	..	..	..	..
31 0	33 6b	32 6b	31 6	31 6	32 6
Buyers.			Sellers.		

• 100

Companies in Liquidation.

Ferreira Gold Mining Co., Ltd. (voluntary); a general meeting will be held at The Corner House, Commissioner Street, Johannesburg, on January 15th. H. A. Rogers, H. C. Boyd, E. J. Renand, and W. H. Dawe, liquidators.

George Ford, Ltd.; a meeting will be held at Trust Buildings, Johannesburg, on January 21st.

Nawton Sinclair Papley Syndicate, Ltd.; a general meeting will be held at the office of Geo. C. Simmonds, liquidator, Lydenburg, on

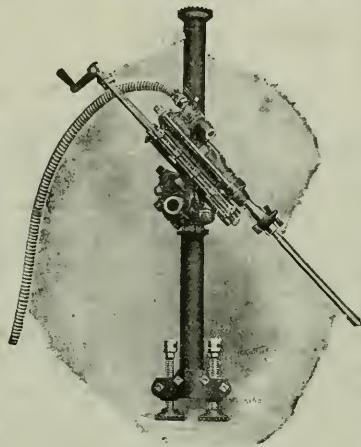
January 17th.

**E. J. MOYNIHAN,
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Engineering Notes and News.

EARTHELD v. UNEARTHED NEUTRALS ON ALTERNATING-CURRENT SYSTEMS.—II.*

[By J. S. PECK, M.I.M.E.]

A case is on record where several generators in parallel were supplying a very high-voltage line through step-up transformers. The neutral point of the generators was unearthing. The lightning arresters on one high-tension phase broke down, and the generator windings were raised to a high potential. One generator broke down, and the attendant, seeing smoke, cut it off the bus-bars. A second machine immediately broke down, and was in turn cut off. This was repeated until nearly all the generators in the station were broken down. The attendant then cut off the excitation. Had the neutral point of the generators, or that of the high-tension side of the transformers been earthed, the trouble could not have occurred in the generator circuit. There is, however, a chance of similar trouble even when the high-tension neutral is earthed, provided the generator neutral is unearthing. This occurs when the insulation between the high and low-tension windings of the transformer breaks down at one point. The low-tension winding then assumes the potential of the high-tension winding at the point of connection, and a breakdown on the low-tension system is almost certain to follow. Where it is considered undesirable to have a direct connection between the low-tension winding and earth, a spark-gap may be placed in the circuit and set to break down at a pressure slightly above the normal voltage of the winding above earth. The use of earth shields between primary and secondary windings are now scarcely ever called for. Thus in the case of generators supplying a high-tension transmission line through transformers, it is highly desirable to earth the neutral point of the generators, and preferably through a rather low resistance. If it is not desired to connect permanently to earth, then a spark-gap should be used in the earth connection. The arguments in favour of earthing the neutral in the case of high-voltage transmission circuits are:—(a) The possibility of cutting off the circuit in the case of an accidental earth on any wire. (b) Reduced cost of transformers and of line insulators due to limiting the voltage above earth to 58 per cent. of line voltage. (c) Reduced cost and closer possible setting of lightning arresters. (d) The possibility of using the earth as a conductor in the event of one line wire being disabled. This requires an earth at both ends of the line. The arguments against earthing the neutral is that an earth on one wire makes it impossible to transmit over the circuit. (a) Whether there is any advantage in being able to cut off a circuit in the event of an earth on one wire depends upon the number of circuits available. In general, there are seldom more than two circuits to any sub-station, and often there is but one, so that cases may often arise where, to keep up the supply, it will be absolutely necessary to operate with one wire earthed. This method of operation would be impossible with an earthed neutral. Also an earth on one wire is not likely to develop into a short circuit between phases, so that there is no particular need for cutting off the earthed circuit. (b) The higher the voltage of the transmission the greater will be the saving in first cost made by insulating the transformer for 58 per cent. of the line voltage and by using line insulators for a corresponding voltage; but in general it is bad practice to adopt this expedient, for it may prove impossible to operate continuously with an earthed neutral, due to disturbances on adjacent telephone circuits which may occur under certain abnormal conditions, and in the event of an earth on one wire it may be essential to remove the neutral connection and operate with one wire earthed. In general it is poor economy to cut down insulation on either lines or transformers. (c) If

the system may sometimes be operated without earthed neutral the lightning arrester equipment must be suitable for this condition, so that there is no saving in first cost; but as long as the system is operating properly with earthed neutral the arresters may certainly be set for lower discharge values than when the system is unearthing. (d) In the event of one wire on an earthed system going to earth, it would still be possible to transmit approximately two-thirds the full amount of power over the two remaining wires, provided the neutral points at both ends of the line were solidly earthed and one line with its corresponding transformers cut out of circuit. In this case the earth would carry full line current, and in very few places would this be allowed on account of disturbances to neighbouring circuits. The neutral point of a high-tension system can be obtained only by connecting the high-tension windings of the transformers in star, or by the use of an auto-transformer, and this latter method is seldom, if ever, used. If the high-tension windings are connected in star, then damage to one transformer disables the whole group, while with the delta connection on both windings one transformer of the group may be cut out and approximately two-thirds the capacity supplied from the remaining transformers. (This does not hold in the case of three-phase core-type transformers, but is true for single-phase and three-phase shell-type transformers.) The conclusions to be drawn from the above are that in the great majority of cases continuity of service will demand that the system be operated with an unearthing neutral, and that in general the transformers should be connected in delta on both high-tension and low-tension windings. When it comes to a study of the question of low-tension distribution circuits, the majority of the arguments presented above will apply here also, but there enters one other consideration, i.e., the danger to human life. If the neutral point of, say 500-volt system is earthed, then the maximum potential above earth which any point of the system can reach is 290 volts. If the system is supplied from a 500-volt generator, the difference between a 500-volt and a 290-volt shock may mean the difference between life and death, or it may not, and there is certainly greater risk of shock from a system which is permanently earthed than from one which is earthed only occasionally. The higher the voltage of the generator the less will be the value of the earthed neutral in preventing danger to life due to reducing the voltage to earth. When the distribution circuits are supplied through step-down transformers, there is always the possibility that the low-tension circuits may be raised to a very high potential, either through an earth on one wire of the high-tension system, or through a connection between the high-tension and low-tension inside the transformer. In the former case there is great danger to low-tension insulation, and in the latter there is danger to life as well as to insulation. Thus, where the distribution circuit is supplied direct from a generator, the advantages of the earthed neutral are the ability quickly to cut off a defective circuit and a possible reduction in risk to life, due to lower maximum voltage to earth; but where the circuit is supplied through step-down transformers from a high-voltage line there is danger to life and apparatus if the neutral is unearthing. Where a single-phase circuit is supplied from a single-phase transformer, the low-tension winding should be earthed, preferably at the middle point of the winding, but it is better to earth one line wire than to leave the system unearthing.

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RECENT STEAM TURBINE PRACTICE.

A Summary of the Developments in the Parsons, Curtis, Rateau, and Zoelly Turbines.

MR. K. BAUMANN writes in *The Mechanical Engineer*:—The development of the steam turbine since the first machine was built by Parsons in 1884 may be divided into two periods of a more or less distinct character. During the earlier period, which may be called the invention period, new types of turbines different from those built previously were developed. The distinct types introduced during this period are called according to the name of the inventor, Parsons, de Laval, Curtis, Rateau, or Zoelly turbines, and consist, with the exception of the de Laval turbine, of a certain number of elements designed on the same principle. For this reason these types are now always referred to as "pure" Parsons turbines, or "pure" Rateau turbines, etc. During the second period, which may be called the development period, the design of the steam turbine has been perfected on the basis of the experience gained on the existing turbines, and of experimental research work founded on the theory of steam turbines. This was made possible to a very great extent by the fundamental work of Prof. Stodola. The year 1902 may be taken as the beginning of the second period of turbine development. During this period not only were great improvements made in the design of the various pure types, referred to above, but further advantages were gained by combining these types in such a manner as to obtain the best results, both with regard to reliability, efficiency, and cost. In order to follow this development clearly, it is necessary to consider the advantages and disadvantages of the different types. These are dealt with below in the following order: (1) Parsons turbine, (2) Curtis turbine, (3) Rateau and Zoelly turbines. The de Laval turbine has been excluded from the descriptions, as, owing to its design, it can be used only for small powers, and it has been developed to the highest degree of perfection by the inventor, de Laval, himself. The pure Parsons turbine has the great advantage of a moderate peripheral velocity which allows a very simple design of fixing the blading. This, in addition to the relatively small drum and cylinder diameters, enables this type of turbine to be manufactured at a considerably lower cost than steam turbines with discs and diaphragms. One of the main disadvantages of the Parsons turbine is that the high-pressure part of the cylinder is subjected to the highest steam pressure and superheat, which becomes more accentuated by the necessity of small clearances in that part, and by the growth of cast iron after repeated heating. A further disadvantage is the use of the balance pistons with very small clearances. The first attempts to overcome these difficulties were made by George Westinghouse, who replaced the high-pressure stages by a Curtis wheel, and overcame the difficulty of the balance piston by using the double-flow arrangement, which had already been used by Parsons on his first turbine in 1884. This arrangement, which practically means the use of two separate turbines, is too expensive for small units, and is therefore only applied for large outputs. For small outputs, where a double-flow turbine is too expensive, the British Westinghouse Company developed in the year 1905 a type known as the single-flow disc and drum turbine, consisting of one Curtis wheel in the high-pressure part of the turbine and a Parsons drum of uniform diameter in the low-pressure part, with corresponding balance piston on the high-pressure end of the turbine. For the newer design the straight single-flow type has been used, with one velocity wheel with three rows of blades in the high-pressure part in order to reduce the pressure in the turbine as much as possible (to about 1:5 atmosphere absolute), and three single-flow Parsons drums with increasing diameter towards the low-pressure end of the turbine. The thrust of the Parsons drum is balanced by an automatic oil piston in connection with a thrust bearing, which forms one of the greatest novelties in steam turbine design. Another feature of their newest designs is the governing of the turbine by oil pressure at the discharge side of a centrifugal pump, without the use of a mechanical governor. The first Curtis patents, dated 1896, refer to turbines of the impulse

type consisting of a number of single Laval wheels arranged in series. The first turbines built by the General Electric Company of Schenectady, who secured the licence for the Curtis patents, consisted of only two pressure stages and two wheels each with four rows of blades; afterwards these were changed, on account of poor efficiency, to four pressure stages and four wheels, each with only two rows of blades. The General Electric Company always built their turbines with vertical shaft, in order to reduce the floor space required. The steam entered the turbine at the top end through nozzles to which the steam was admitted by separately-controlled valves opened one after the other according to the load. The General Electric Company were the originators of the nozzle-controlled turbines. The pure Curtis turbine has the great advantage of small pressures and low temperatures in the turbine casing, due to the relatively great expansion through the first nozzles. The Curtis wheels in the low-pressure end, which cannot give as good efficiencies as single wheels, were replaced by the more expensive Rateau wheels, in order to obtain a turbine with a competitive efficiency. The principle of the Rateau or Zoelly turbine is very old. In 1827 Real and Pichon took out French patents for a similar turbine with 31 wheels. Another patent for a similar turbine was taken out in England in 1876 by Edwards as a communication from Jas. Mourhouse, of Petersburg. This turbine was also of the impulse type, and was provided with 25 wheels. The credit for the further development of this type must, however, be given to Prof. Rateau. The first turbine, which was built by Prof. Rateau, in 1898, together with the engineering firm of Sautter, Harle & Co., of Paris, consisted of only one wheel

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running at a very high peripheral velocity. This design, however, was found to be too expensive, and the next turbine was made as a multi-stage turbine, which consisted of a series of discs rotating between diaphragms, in accordance with Prof. Rateau's patents. One of the first turbines of this type actually built consisted of 25 wheels in two casings. The peripheral velocity was kept rather low, in order that built-up wheels, consisting of boiler plates riveted to a boss on the shaft could be used, which at that time were cheaper than forged wheels. Soon afterwards this type of turbine was made with a smaller number of wheels in one casing by the Engineering Works, Oerlikon. The Zoelly turbine, of which the first machine was made in 1903, was similar to the Rateau turbine, the only exception being that the number of wheels was considerably reduced. The wheels were made out of forged steel, and this enabled the designers of the Zoelly turbines to increase the peripheral speed considerably, and at the same time to decrease the number of wheels. The first Zoelly turbine consisted of 12 wheels in two casings, in a similar manner to the Rateau turbine. The patents of Zoelly refer to a particular method of fixing the blades on a rotating disc. Another peculiarity of the first Zoelly turbines was the open blade without shrouding. The reduction in the number of wheels was proved to be a great advantage, and this, together with the care exercised in the design of the detail parts which were partly taken from the water turbines—e.g., the governor, with oil relay—caused a very rapid commercial development of the Zoelly turbine. The design in which two casings were used was soon abandoned for one with a single casing. Both Zoelly and Rateau used similar diameters for the high-pressure wheels and large diameters for the low-pressure wheels, in order to keep the disc friction and ventilation losses of the high-pressure wheels as small as possible. On the other hand, this increased the number of stages, and consequently lengthened the turbine—it further involved the introduction of high pressures and high temperatures in the turbine casing, the danger of which was not fully realized at that time. Also it was usual on these turbines to have the shaft running above the critical speed, so that when starting up, the turbine had to pass through the first critical speed. The experience gained in the running of this design of turbine emphasized these disadvantages, and forced the builders of the Rateau and Zoelly turbines to change their designs by adopting the same diameter of wheel all through the turbine in order to reduce their number and to shorten the machine. In addition, the pressure drop through the first nozzles was increased in order to decrease the pressure and temperature in the turbine casing. The sacrifice in the efficiency of the high-pressure wheels was balanced as far as possible by the improved efficiency obtained on the low-pressure wheels. These alterations were made at the same time by Zoelly and Rateau in 1908, and proved a great advance. The recent development of the various steam turbines outlined above shows very clearly the tendency towards the use of the two types known as the disc and drum type or the Curtis-Parsons type and the Curtis-Rateau type. This must be considered the most important type at present in use, as is best known by the fact that practically all turbine boilers in this country are adopting one or the other, and it will therefore be interesting to examine closely the points of difference between them. To do this it is necessary to consider the two types with regard to reliability, economy, and first cost. This examination will show that it is not possible to give a definite statement that in general one is better than the other, but this depends on the particular conditions under which the turbine is required to work in any particular case. The reliability of the turbine will depend much more on the design of the details than on the principle on which it is constructed. It is quite certain that the design of the fixing of the blades, for instance, which does not depend on the type of the turbine, is of great importance. But it is also evident that a turbine with very small clearances between fixed parts and parts running at a relatively high velocity will not be so reliable as a turbine with large clearances between these parts. Dividing the turbines into three categories:—1. Turbines with small outputs less than 750 kilowatts at 3,000 revolutions per minute,

or less than 2,250 kilowatts at 1,500 revolutions per minute. 2. Turbines with moderate outputs, 750-1,500 kilowatts at 3,000 revolutions per minute, or 2,250-4,500 kilowatts at 1,800 revolutions per minute. 3. Turbines with large outputs, above 1,500 kilowatts at 3,000 revolutions per minute, or above 4,500 kilowatts at 1,500 revolutions per minute. The relative position can be stated as follows:—For turbines with small outputs the disc and drum type is certainly cheaper—*i.e.*, the disc and drum type can be made at a lower price for the same steam consumption, or allowing the same price for both types, the disc and drum turbine can be made with the better efficiency. For moderate outputs the two systems are about equal with regard to economy and first cost. For large outputs the Curtis-Rateau turbine is the better because the disc and drum type would have to be made as a double-flow turbine, in the low-pressure part, which would increase the cost of the turbine considerably without a corresponding increase in efficiency. In short—The drum turbine is the design for small outputs. The disc design is the design for large outputs.

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New Patents.

- 629. Gotthold Issler.—Apparatus for liquefying solid nitro-bodies or other chemical substances.
- 630. Thomas Albert Mills.—Production of cinematographic effects in colour.
- 631. James West.—Improvements in drills having renewable bits.
- 632. Cyril Douglas McCourt.—Improvements in processes and apparatus for calcining or treating material in granular form.
- 633. Emmanuel Trullson.—Improvements in and relating to mills for reduction of ore and other materials.
- 634. Sidney Sherrard Osborn.—Improvements in filtering apparatus.
- 635. Arthur Reginald Angus.—Improvements in or relating to railway safe running devices, "H."
- 636. John Albert Doherty.—An improved outer cover for pneumatic tyres.
- 637. James Grant Gibson.—Improvements in or relating to concrete block making machines.
- 638. George Heathcote Rotherham.—An improved tube mill lining.
- 639. William Fennell.—Improvements in or in connection with tube mills.
- 640. Guy Aubrey Chalkley and George Hans Kirsch.—Improvements in rock drilling tools with detachable blades.
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Finance, Commerce, and Industries.

The recent general meeting of the shareholders in the "Phoenix" Works—one of the largest industrial concerns in Europe, and represented in South Africa by Messrs. Andrew & Thienhaus, Ltd.—discloses a remarkable degree of prosperity in all its branches, and a few figures regarding this company, which was established over sixty years ago, and is chiefly interested in the manufacture of steel products, including piping, rails, steel castings, wire, locomotive wheels and axles, etc., etc., as used in South Africa, may be of interest to those engaged in the local consumption, distribution or manufacture of such articles. The sales during the financial year ending 30th June, 1912, amounted to over six and three-quarter million tons. This figure includes the sale of coal from the company's own coal mines, raw material such as pig iron, blooms, etc., together with the by-products evolved from the smelting and refining of the iron ore. The coal consumed during the year amounted to three million tons, all of which was mined by the company. Of the finished products such as detailed above, 1,332,225 tons were sold during the year under review, while the orders in hand at the end of the financial year amounted to 456,000 tons. The value of the plant employed in effecting this enormous turnover is estimated at six and a half millions sterling. A dividend for the past financial year of 18 per cent. was declared, and the nett profit for the first three months of the current financial year amounted to £618,000, as compared with £412,000 for the corresponding period of the previous year. A pleasing feature in connection with this company is the extent to which the savings bank established by the company for the exclusive use of its employees, is taken advantage of. There are 38,000 workmen employed, and the balance standing to their credit in the way of deposits amounts to £405,000, on which interest at the rate of 5 per cent. per annum is paid by the company. As an instance of the increase in wages which has taken place during recent years, it may be pointed out that the yearly wage earned by each of the above-mentioned employees averages out at £78 9s. 6d.

* * * *

The following are the terms of the agreement between the South African shippers and the regular steamship line trading to the Union ports of South Africa, which the London Merchants' Committee have, by a majority, decided to recommend to the trade:—

(1) This agreement is entered into for the purpose of maintaining regular steamship services from the United Kingdom and the Continent to the South African Union ports with stability of freight and equality of rates to large and small shippers alike. (2) The undersigned shipowners hereby agree to supply steamers to maintain the present regular berth sailings to the Union ports of South Africa and to provide sufficient tonnage for the ordinary requirements (including a (natural increase) of the trade. Steamers to sail on the advertised dates as far as practicable, full or not full. (3) The rates of freight shall be the present berth rates of freight (with 5 per cent. primage in respect of the mail steamers only), but without rebates for all descriptions of cargo. The shipowners reserve liberty to revise rates as circumstances may from time to time require, but they shall not without consultation with the South African Merchants' Committee increase rates to meet the greatly increased cost of working the steamers beyond the following, taking the present tariff rates to Capetown as the basis, viz.: Where the present rates are 30s. per ton and upwards, 5s. increase per ton; where the present rates are 25s. and under 30s. per ton, 3s. 9d. increase per ton; where the present rates are below 25s. per ton, 2s. 6d. increase per ton. And the same respective increases shall apply to other Union ports for the same description of goods. In the event of no mutual agreement for further increase of rates being reached, the matter then to be submitted to arbitration. (4) In consideration of the shipowners supplying and maintaining the regular services, the undermentioned shippers agree to give their entire support to the undermentioned steamship lines from the United Kingdom and Continent, and also to the German lines at present in the South African trade from the Continent, provided the German lines maintain the same rates as the English lines. (5) In the event of opposition steamers disturbing the stability and equality of rates, the undersigned shipowners will co-operate with the South African Merchants' Committee to take such steps as may duly protect the interests of both parties, and, should no agreement be arrived at within fourteen days, then any of the signatories hereto may withdraw from this agreement upon giving thirty days' notice,

but such notice shall be void if during the currency of same an agreement is arrived at. It shall, nevertheless, be competent for the parties by mutual consent to extend the time, for a period not exceeding thirty days, for the purpose of arriving at an agreement, and any notice of withdrawal given shall be void if during such extension an agreement is arrived at; but such withdrawal shall not invalidate this agreement between the remaining signatories. (6) This agreement shall not apply to large parcels of cargo not being merchants' berth cargo, but the shipowners agree not to make special arrangements at preferential rates to the prejudice of those shippers signing this agreement, as regards the carrying off of such cargo, except with the concurrence of the South African Merchants' Committee. This shall not apply to railway material. In the event of any disagreement between the shipowners and the South African Merchants' Committee as to what is not merchants' berth cargo, the same to be submitted to arbitration. (7) The shipowners shall be at liberty to suspend their obligations under this contract in the event of any declaration of war, or of war breaking out between any two or more first-class Powers, or in the event of any revolution, riot, civil commotion, strike, lock-out, or labour dispute, rendering it impracticable for them to carry out the said obligations. (8) The shipowners undertake not to take cargo on ship's account, except coals to fill up. (9) Notwithstanding anything in this agreement any shipper shall be at liberty to ship by sailing vessels. (10) All alterations in and additions to the tariff of rates of freight to be communicated to the South African Merchants' Committee as hitherto. (11) Shippers signing this agreement are to give the shipowners a list of marks, on whose behalf they are willing to come under this agreement, and if there be any corporations, companies, firms, or individuals for whom the shippers act, who refuse to come into this agreement, the said signing shippers shall not be prejudiced thereby so far as their declared assenting marks are concerned, and the same shall apply to any withdrawal allowed by the terms of this agreement. (12) This agreement is to continue to December 31, 1913, and is subject to six months' notice thereafter by any of the parties hereto for themselves only; provided, however, that in the event of this agreement not securing stability and equality of rates (apart from clause 5), the shipowners and the South African Merchants' Committee shall meet to discuss the situation, with a view to such modification being made as may be considered necessary, and in the event of no satisfactory agreement being arrived at, any of the signatories hereto, for themselves only, may withdraw therefrom on giving three months' notice; and provided further that this agreement may be terminated by any of the parties for themselves only, on giving fair and reasonable notice in the event of its being held to be a contravention of the Post Office Act, 1911. The Union Castle Mail Steamship Co., Ltd., may withdraw from this agreement on giving fair and reasonable notice, but their withdrawal shall not otherwise terminate this agreement, and shippers shall have the liberty to ship by the Union Castle Mail Steamship Co., Ltd., from the Continent, Middlesborough, London, and Southampton. Liberty is reserved for the Houston Line (Messrs. R. P. Houston and Co.) to become signatory to this agreement any time before December 31, 1913.—Renter S.A. Press Agency.

* * * *

In the suggested scheme of light railways for development purposes the following are the main points favoured by the Pretoria Chamber of Commerce:—Extension of the line from Rustenburg to Zeerust; an extension from Pienaar's River through the Rooiberg tin-fields to the Bechuanaland border; again, from Bronkhorstspruit along the Wilge River to somewhere in the neighbourhood of Zeberdela's Location—to connect ultimately with the Low Country railway. There is also the Messina-West Nicholson extension—a most important connection as affecting the trade of the Witwatersrand and this district. The Government is strongly favouring this. Such a line would directly link up to Rhodesia without a divergence of the trade route via the Cape border, and would give a saving of hundreds of miles. From West Nicholson to Messina—the terminus of the Transvaal section of the Union Railways—is a comparatively short distance. With the connection of the two termini by a line as suggested a direct through route to Rhodesia would be secured.

* * * *

In submitting their report for the year ended September 30 last, the directors of the Saldaqua Bay Harbour and Railway Company, Limited, Saldanha Bay Harbour, state that the company has an overdraft at its bankers, which is guaranteed by the directors, in addition to the loan of £10,000 from the same bank, and there is also an amount owing for arrears of interest on debentures held by the directors, who have agreed to let the payment stand over for the time being.

* * * *

Whatever direct results may follow the proceedings of the Dominions Royal Commission, a very valuable opportunity has been afforded for a series of authoritative statements in regard to certain outstanding commercial questions affecting the South African market. At the recent sitting for the purpose of hearing evidence by members of the London Chamber of Commerce, the South African section was very strongly represented, and the views put forward by the witnesses have since been widely canvassed throughout the trade.

According to the *B. and S.A. Export Gazette*, a grievance that has long smouldered in commercial circles, and which has lately taken an aggravated form, was effectively ventilated by Mr. William Soper, Chairman of the South African Section, in his protest against Government trading, mainly in connection with the Union railways. When, as in South Africa, a Government owns and administers a great national service, it is, of course, extremely difficult to say where the line should be drawn in regard to the trading activities involved, and the keener the spirit of the responsible officials in their efforts to make a commercial success of their work, so much the greater is the necessity for a jealous watchfulness on the part of merchants. The subject was recently dealt with in these columns, and Mr. Soper carried it even further, for he not only emphasised the competition with private traders created by the sale by the Union Government of wire to farmers below landed cost on the deferred payment system, the profitable catering which the Railway Department does in its restaurants and trains, and the forwarding work officially undertaken at the ports, but drew attention to the possibility of the Government erecting grain elevators at various centres, and thus finding themselves eventually in the position of actual buyers of grain. Further, he pointed to the anomalous position of the Government as importers of large quantities of materials and stores at special rates under the mail contract, although special contracts of the kind between ordinary importers and shipowners are now illegal under the Post Office Act. Mr. Soper made out a strong case, and he might have added to the indictment such other counts as that the Government manufactures part of its own railway rolling stock, that it carries on the manufacture of mineral waters, that it runs the railway bookstalls and its own paper, and that it has its own laundry at Braamfontein. Justifiable as some of these enterprises may be rendered by circumstances, the fact that they show a profit renders them none the less objectionable to the business world.

The Futil Duties on Manufacturers' Catalogues.—Much of the evidence given before the Commission naturally had to do with various forms of trade taxation. It was not surprising, for example, to find Mr. H. Lambert Symonds, Acting Chairman of the Manufacturers' Section of the London Chamber, putting forward a strong protest against the imposition in South Africa and other parts of the Empire of duties on British catalogues and advertising matter, while Mr. Albert H. Sytner, Deputy Chairman of the South African Section, also described these duties as "an irritating impost," and added that the Section felt very strongly that representations should be made to the Dominions affected advocating the abolition of this restrictive legislation. As he pointed out, these duties were originally intended to protect the interests of the Colonial printer, but obviously could serve no such purpose in regard to oversea manufacturers' catalogues, nor do they bring in revenue to any appreciable amount. In fact, they are disliked by every section of the commercial community, equally in the Mother Country and the Dominions, and, as we have so often urged, should be regarded as a legislative misfire and abolished at the earliest possible opportunity.

Taxation of Oversea Representatives.—In devoting special attention to the subject of commercial travellers' and agents' licences, Mr. Sytner, who is to be complimented on the fairness and clearness of statement that characterised his evidence, showed that he appreciated the importance which this highly controversial matter has assumed. Without being able to follow him in his unequivocal advocacy

of the travellers' tax, we can at least admit that he stated the view of a certain section of the mercantile community very moderately and well. He spoke for "the large wholesale firms," and argued that while the merchants were taxed as such, there was no reason why the representatives of oversea firms should escape. That is undoubtedly a legitimate point to put forward, though it is only fair also to say that the oversea representative adds materially to the buying facilities of the Colonial merchant, and deserves special consideration in view of a number of other reasons which have frequently been advanced in these columns. But Mr. Sytner's further argument that oversea representatives are guilty of taking orders from small shopkeepers, and even private individuals, calls for more serious attention. He claims knowledge of concrete instances of the kind, and no one with any experience of the market will be disposed to contradict him, but it is only fair to recognise that the practice complained of is not a general one, and is certainly not countenanced by Home firms who carry on their export activities on businesslike lines. The point at issue, therefore, is whether the whole fraternity of oversea representatives should be penalised for the sins of the few, especially as the wholesale buyers can and do inflict their own penalty in individual cases by refusing to deal with firms whose representatives are guilty of indiscriminate canvassing for orders. To argue, as did Mr. J. E. Corfy, Chairman of the Textile Section of the London Chamber, that commercial agents representing oversea firms should entirely escape a special tax is, however, to go beyond the present range of practical politics, especially while similar duties are levied in Australia, New Zealand, Canada, and other countries. Their most serious complaint is that they are taxed disproportionately to the merchant or any other section of the community, and here Mr. Sytner is their very effective advocate, for he rightly describes the minimum tax of £50 per annum in the Cape Province, with £5 extra for every agency beyond the first, as excessive, and his plea for a moderate uniform tax throughout the Union will be generally supported.

* * * *

Messrs. Torre do Valle & Co., chief agents for the Transvaal Coalowners' Association, have supplied the

Delagoa Coal Trade.

following particulars showing the progressive coal trade at the Port of Delagoa for the year just ended:—Cargo, 177,229 tons; bunkers, 138,809 tons; total, 316,038 tons. Cargo (first six months), 57,110; bunker (first six months), 71,016 tons (chiefly due to strike in Wales). Cargo (second six months), 120,119 tons (increase due to reduction in railway rates); bunker (second six months), 67,793 tons. Totals—Cargo, 177,229 tons; bunker, 138,809 tons. These figures are far and away superior as compared with the tonnage dealt with in any previous year. Indeed, until the reduction in the railway coal rate from Witbank during the latter half of 1912 no impetus was possible in the export trade in Transvaal coal through this, its natural port; but now that the reduction granted has resulted in the foundation of an important connection being made with the Indian market it is possible to assume that the total amount of coal to be handled here during 1913 will probably reach half-a-million tons. It is fair to assume that with another small but essential reduction in the railage for all coal, whether for bunkers or export, and with the erection of a much-needed coaling installation at the wharf, the all-round demand will rapidly increase until, in the words of the Director of the Port and Railways, Delagoa will bid fair to become the Cardiff of the Indian Ocean. The trade for last month fell somewhat short of the recent average, owing to so many vessels being engaged in the Mauritius-Australian sugar trade, but matters will now become normal. The December figures were:—Cargo, 20,237 tons; bunkers, 10,657 tons; total, 30,894.

Specimen copies of the *South African Mining Journal* can be had from our offices at 125, Salisbury House, London Wall, E.C.

Automobile Notes.

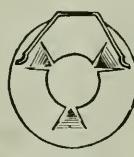
Motor Enterprise.

The cabled intelligence this week that the De Dion motor car firm is dispatching a representative to open up a branch factory at Johannesburg has been favourably received by the entire motorist community in these parts. An enterprise of this nature, which will mark a new era in the history of South African automobilism, has been anticipated for some time, in motorist circles, but probably few were aware which firm of manufacturers would take the initial step. The world-renowned De Dion Bouton firm of motor car builders has become a household word, for the material embodied in the machines of that name, which, in point of value, efficiency, and reliability display a decided excellence. The manufacturers are among the pioneers of the automobile, and some of the old fabrics produced by this great firm are still performing valuable services, even in Johannesburg. The history of motor-driven vehicles starts somewhere back well over a decade ago in Johannesburg annals, when the residents at the time received, in an astonished way, a small-powered car of the Benz type—the property of a Mr. Jacobs. Since those early days steady progress has been made, until at the present time we have cars by the hundred from the diminutive two-seater to the lordly limousine, each propelled by a complicated motive system, but nevertheless perfect in operation. The establishment of works for the manufacture of automobiles cannot fail to impart fresh impetus to the South African motor industry, and doubtless the design and construction of the locally-built machines will conform to the peculiar conditions, as exacted in very special manner, the manufacturer "on the spot" determining the actual requirements in a way obviously prohibitive 7,000 miles from the seat of a car's operation.

The "Vulcan."

The 15·9 h.p. Colonial model Vulcan is an exclusively British-built car, adapted in admirable manner for use in South Africa, and one of which much will probably be heard

in the near future. This model has its four cylinders cast in pairs; the valves are enclosed and operated by a single cam shaft; the engine and gearbox being constructed on the unit system. Mechanical lubrication by the trough system is employed, oil being also conducted to the timing wheels. Four speeds, and the usual reverse, are provided, whilst the gear change mechanism is of the selector sliding type, direct drive being on the top speed. Several distinct and interesting features are embodied in this model, which are set forth in the catalogue issued by the local representatives of the machine, T. B. Adair & Co., of this city.



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S.A. Roads v. American.

The plaintive cry of the South African motorist for the betterment of the road system is very real and largely justified, considering the substantial tariff in regard to licences with which he is levied. The vastness of the territory, and the sparse population, however, combine to render difficult the task of complete road systems, such as obtain on the continent and elsewhere. The leading towns of the several colonies can boast of roadways in the main to which little exception can be taken. In Kroonstad, O.F.S., for example, an excellent system of broad roadways has been undertaken, and reflects creditably the enterprise of the Municipality of that town, and to which the attention in other parts might, with advantage to the motorist's interests, be directed. That many district roadways are permitted to remain in sore disrepair is to be deplored, and the motorist who is hapless enough to wander from main routes will experience difficulty in endless fashion. South Africa, however, is not alone in the matter of questionable roadways, according to the impressions formed by a visitor who recently toured America. In many cities in the States the streets in the ordinary way, he maintains, resemble British thoroughfares with the tram-lines up, and over some a bicycle would have to be carried, while outside the cities the roads proper are mere dirt tracks with ruts some 12 inches deep on an average. "A pretty state of affairs!" he adds. Other opinions formed are that cars are not driven as fast as in other parts of the world—and with evident good reason—and the traffic control impresses one as being very efficient. The great manufacturing city of Detroit is mentioned as an example, where regulations are in force at certain hours of the day when the factories are being emptied of employees, the out-town traffic is directed to one route, and the in-town traffic to another. A commendable arrangement in a city where the motor is peculiarly ubiquitous, and one which might be earmarked by the authorities responsible

for street control in Johannesburg, with its increasing traffic, so often congested in the absence of systematic regulations.

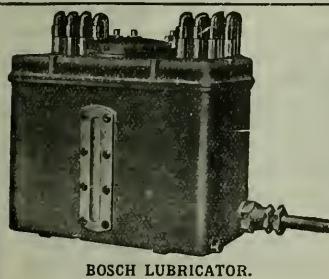
Cars of 1913.

South African motoring circles anticipate that the return of the several promoters of the automobile industry of this country who have been visiting Olympia and the Great British and continental motor factories will stir up still further competition and arouse interest by the introduction of some new types of cars for the S.A. market. The influence of the cheap American car will undoubtedly be felt in 1913; in fact, its sale is one of the most remarkable features of present day motoring, and has provided a problem for the British manufacturer, which has not been altogether solved to his satisfaction. The standard set by the British manufacturer is certainly very high, and it is open to question if this average excellence can be attained to by the trans-Atlantic makers. Countless motorists pin their faith to the British manufacturer, and maintain that he will not attempt anything crude, even though the experiment may result in marketing a car at a considerably low price.

The number of British firms who have decided to manufacture the cycle car is surprising, and, as suggested, it goes against the grain to turn out inferior machines; therefore, it may be accepted that the cycle-car of 1913 will prove an excellent machine, and present a formidable rival to the cheap American car, over which such an unnecessary scare has been created.

"Here and There."

The use of the business motors for haulage and general delivery of goods in South Africa will resolve itself into a very live question in the present year, especially when it can be proved to the merchant and other users' satisfaction that



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the upkeep can be reasonably limited. Cheaper fuel than is at present obtainable will largely decide in favour of the adoption of the motor wagon services, while a better road system, so important to the progress of the commercial motor industry, will be a favourable factor in lessening the severe treatment to which the tyres of heavy motors are subjected to at present on roads outside municipal boundaries.

* * * *

Many writers on the question of the high price of petrol agree on the advisability of all motorists taking a combined

stand against the present price, and wrench, if possible, the trade from the hands of the syndicates and trusts, who now control the trade in this spirit. The formation by motorists of limited companies has been suggested as a means to effect the issue, to work oil-producing properties and supply petrol first to members individually and then to the general public. The scheme has met with a certain amount of favour and is one which might be worth consideration in South Africa, where the petrol question is none the less acute, and having regard to the fact that oil fields are known to exist in British territory in the sub-continent.

The Central Mining and Investment Corporation, Ltd., announce that Mr. Hermann Eckstein has been appointed assistant manager in Johannesburg as from January 1. Mr. Eckstein has played an important part in local industrial affairs for some years past, and both he and the big Corner House firm are to be congratulated on the appointment.

Robinson Group.

The results of the operations of the mines of the Robinson group for last month are as follows:—

	Tons Milled.	Total Yield.	Estimated Profit per Fine ozs.	Profit per Ton Milled s. d.	
Randfontein Central ...	216,648	63,322	£88,207	8/1·71	
Langlaagte Estate ...	53,766	14,460	18,018	6/8·42	
Profit for group £106,225					

"First Aid" Demonstration.

At the close of the demonstration to be held at the Volunteer Drill Hall on Wednesday next, under the auspices of the St. John Ambulance Association (Transvaal Centre), the awards will be presented by His Excellency the Governor-General.

The S.A. Mining Directory.

The *Transvaal Leader* says:—A handbook which will be of the greatest utility to mining people as well as the general public has been issued by the S.A. Mining Journal. It is called *The South African Mining Directory*. It deals with the mining districts of the Rand, Rhodesia, the Free State, the Cape, and Natal, and includes the coal, the gold, and the diamond industries. It gives an accurate list of the principal officials, from the manager downwards, and arrangements have been made to issue it monthly, so that the changing character of the personnel of the mines may be dealt with. Complete and revised lists are included of all the officials and members of the various organisations connected with the mines, such as the W.N.L.A., the new Labour Recruiting Corporation, and public bodies such as the S.A.R. and Union Mines Departments. The significance of the publication to merchants, agents, storekeepers, and the whole business community that has daily dealings with the men in positions on the mines, needs no emphasis. In a hundred different ways and in a hundred different spheres of business, the work will be found invaluable for everyday use. To merchants and agents anxious to circularise the mines and to ensure that their circulars come under the personal notice of the leading officials, the accuracy of the directory will prove of the utmost importance. And then there is the utility to business men of acquaintance with the names of the actual holders of the more important positions on the mines. Business men will also recognise the importance of knowing the correct telephone numbers, addresses and designations of the leading officials.

TO CONTRIBUTORS.

The Editor invites Contributions on any subject of interest relating to mining and other industries of South and Central Africa, as also of suitable non-copyright photographs or snapshots of mining or engineering interest. Subject to special arrangement, the scale of remuneration for all articles inserted is at the rate of Two Guineas per page, and 5/- for every photograph. No responsibility can be accepted for safe transmission, but anything that may be submitted that is not accepted will be returned if a stamped and directed envelope is enclosed for the purpose.

The report of E. W. Tarry and Co., Ltd., for the year ended 31st August, 1912, presented at the meeting on the 20th December last, states that the result of the year's trading is not quite so favourable as last year. From September to December, 1911, trade was fairly active, and a full share of the business passing was secured. Since the turn of the present year, however, there has been a decline, due chiefly to the excessive importation of all kinds of materials, which have been forced on the market at unremunerative rates. This overtrading is more particularly reflected in the decreased business done by the Johannesburg branches. A more encouraging feature, however, is the market and steady advance which is being made by the farming industry. The profit for the year amounts to £22,911, which, with the balance brought forward, £6,614, makes £29,525. The directors recommend a further dividend on the Ordinary shares of 5 per cent. (making a total of 7½ per cent. for the year), and place to reserve £3,000, carrying forward £6,275.

The Special 21st Anniversary Number of the "South African Mining Journal" is now on sale at the various branches of the Central News Agency. The number is, of course quite distinct from the ordinary weekly issue of the paper, and is published at 3s. 6d. per copy. All orders will be executed by the Central News Agency.



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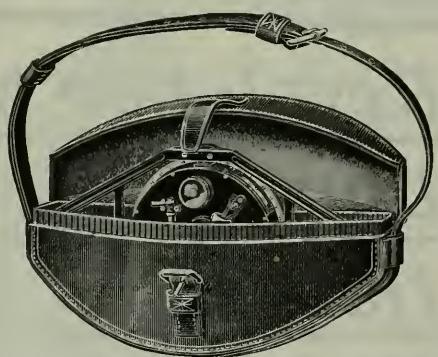


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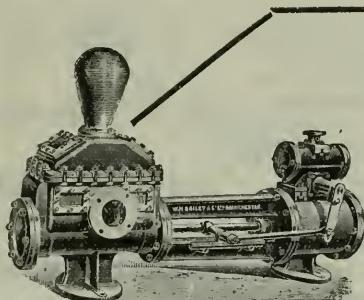


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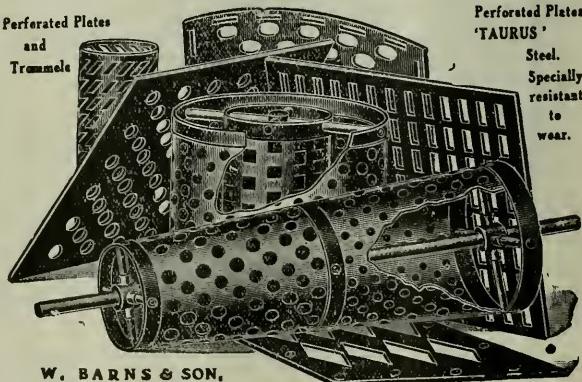
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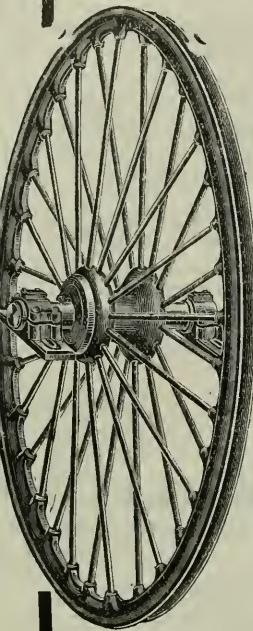
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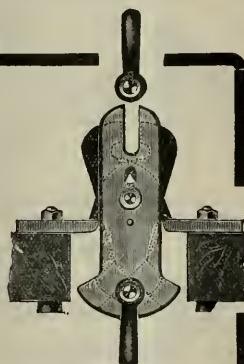


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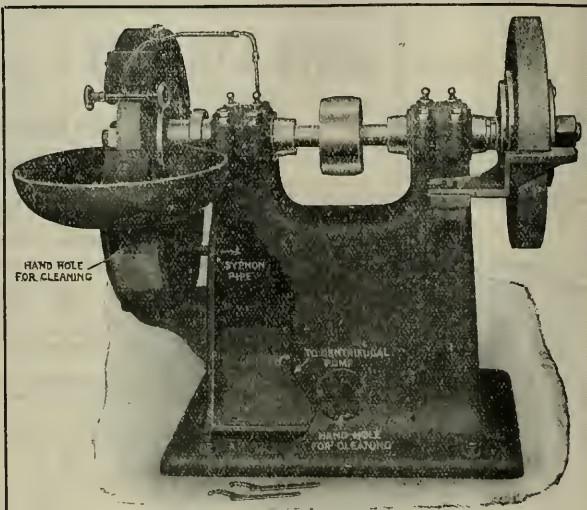
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Notice to Shareholders.

NO TICE is hereby given that the Fifteenth Ordinary General Meeting of Shareholders in the above Company will be held on TUESDAY the 18th day of MARCH, 1913, at 11 15 a.m., in the Board Room, Lace Building, Johannesburg, for the following purposes:—

1. To receive and consider the Balance Sheet, Profit and Loss Accounts, and Directors' and Auditors' Reports for the year ended 31st December, 1912.
2. To elect two Directors in place of Messrs. Llewellyn Edwards and Julius Jeppé, who retire by rotation, but, being eligible, offer themselves for re-election.
3. To appoint Auditors for the ensuing year, and to fix the remuneration of the Auditors for their past services.
4. General Business.

The Transfer Books of the Company will be closed from the 10th to the 18th March, 1913, both days inclusive.

By Order of the Board,

J. E. ROBERTSON, Secretary.

Lace Building, 58, Fox Street,
Johannesburg, 7th January, 1913.

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NOTICE TO SHAREHOLDERS.

NO TICE IS HEREBY GIVEN that the Thirteenth Ordinary General Meeting of Shareholders in the above Company will be held in the Board Room, Consolidated Gold Fields Buildings, Simmonds Street, Johannesburg, on FRIDAY, 28th MARCH, 1913, at 11 30 o'clock in the forenoon, for the following purposes:—

1. To receive the Reports of the Directors and Auditors, and to consider the Balance Sheet at 31st December, 1912, and Profit and Loss Account from 1st January, 1912, to 31st December, 1912.
2. To elect two Directors in the places of Messrs. F. D. P. Chaplin, M.L.A., and M. S. Smits, who retire by rotation, but are eligible and offer themselves for re-election.
3. To elect Auditors for the ensuing year and to fix the remuneration for the past year's audit.
4. To transact such other business as may be transacted at an Ordinary General Meeting.

The Transfer Books of the Company will be closed from 20th to 28th March, 1913, both days inclusive.

By Order of the Board.

The Consolidated Gold Fields of South Africa, Ltd.,
Secretaries.

per J. D. LOW.

Head Office : Consolidated Gold Fields Buildings,
Simmonds Street, Johannesburg,
8th January, 1913.

The Simmer Deep Limited.

(Incorporated in the Transvaal.)

NOTICE TO SHAREHOLDERS.

NO TICE IS HEREBY GIVEN that the Sixth Ordinary General Meeting of Shareholders in the above Company will be held in the Board Room, Consolidated Gold Fields Buildings, Simmonds Street, Johannesburg, on FRIDAY, 28th MARCH, 1913, at 12 o'clock noon, for the following purposes:—

1. To receive the Reports of the Directors and Auditors, and to consider the Balance Sheet at 31st December, 1912, and Statement of Income and Expenditure from 1st January, 1912, to 31st December, 1912.
2. To elect two Directors in the places of Messrs. F. D. P. Chaplin, M.L.A., and E. Birkenruth, who retire by rotation, but are eligible and offer themselves for re-election.
3. To elect Auditors for the ensuing year, and to fix the remuneration for the past year's audit.
4. To transact such other business as may be transacted at an Ordinary General Meeting.

The Transfer Books of the Company will be closed from 20th to 28th March, 1913, both days inclusive.

Holders of Share Warrants to Bearer intending to vote at this meeting must comply with the regulations concerning the issue of Share Warrants.

By Order of the Board,

The Consolidated Gold Fields of South Africa, Ltd.,
Secretaries.

per J. D. LOW.

Head Office : Consolidated Gold Fields Buildings,
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